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Final Report
for the
Training Development Study For
Aviation Testbed
Collective Task Assessment

Loral Systems Company
12151-A Research Parkway
Orlando, Florida 32826

May 26, 1994

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Simulation Training and Instrumentation Command
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John C. Tallas
Barbara Bailey
Dave Behringer

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This study features an analysis of data collected from 596 questionnaires which were administered to a site user population of students, cadre, and active and reserve component soldiers. The study focused on determining the Army Aviation pilot/crew/unit collective tasks that Battlefield Distributed Simulation-Developmental (BDS-D) can facilitate in a service school setting and determined the feasibility of coordinating operational training exercises in a combined arms environment. Users were asked to evaluate thirteen BDS-D attributes in terms of their impact, positive or negative, on collective training. Additionally, respondents determined which of the attributes were the best and worst features of BDS-D.

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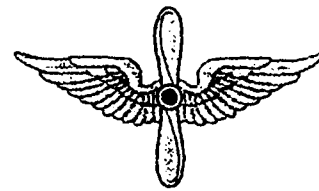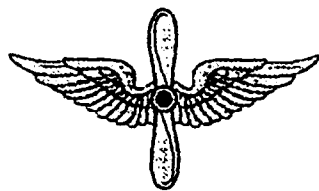
Training
Development Study
for Aviation Testbed
Collective Task Assessment

FINAL REPORT

May 18, 1994

The AVIATION TEST BED
Building 5101, P.O. Box 620385
Fort Rucker, Alabama 36362-0385

FINAL TEST REPORT
Phase IV
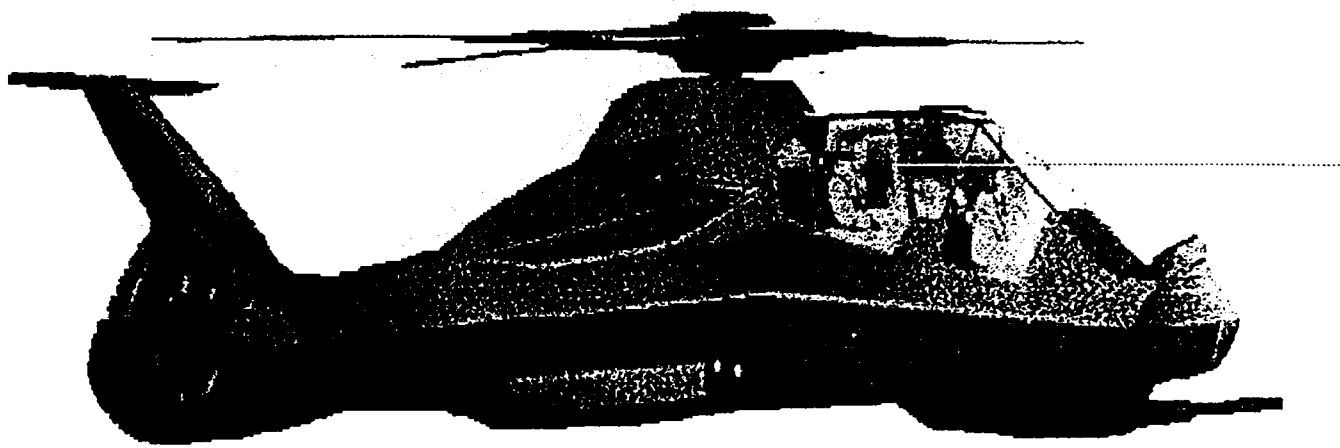
Training Development Study

Directorate of Training, Doctrine, and Simulation
U.S. Army Aviation Center
Fort Rucker, Alabama

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FINAL TEST REPORT
PHASE IV
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Background

The Training Development Study, undertaken by the Aviation Test Bed (AVTB), was directed by the Commanding General, U.S. Army Aviation Center and Fort Rucker. The study focused on determining the Army Aviation pilot/crew/unit collective tasks that Battlefield Distributed Simulation - Developmental (BDS-D) can facilitate in a service school setting, and determining the feasibility of coordinating operational training exercises in a combined arms environment. This particular study was financed by the Simulation, Training, and Instrumentation Command (STRICOM), and sponsored by Fort Rucker's Directorate of Simulation. It was conducted under the stewardship of A John Miller, Site Manager (Loral TTS), and authored by John C. Tallas (Loral TTS) and Barbara Bailey (Loral TTS) with contributions by Dave Behringer (Loral ADS).

General
History

The Training Development Delivery Order (TDDO) has run continuously at the AVTB since early 1990. Funding sources have changed, which resulted in the appearance of different TDDOs being conducted. The actual differences are the aforementioned funding sources and the specific time frame of each delivery order. As a result, preparation of this final technical report meets the requirements contained in the contract data requirements list. It is, however, a continuation of previous studies emanating from the TDDO.

Documentation

This report is prepared as a stand-alone document. Its precursor, entitled <u>Training Development Study for the Aviation Test Bed Collective Task Assessment Final Report</u> and dated February 28, 1993, contains all of the necessary background documentation. Economic considerations preclude the inclusion of cited background documentation in this report. Readers desiring to review this background data are encouraged to submit telephonic requests to one of the authors either commercially at (205)598-3066, or via DSN at 558-2234.

Population

The study population for this report consists of students from the Aviation Officer Basic and Advanced Courses, the Pre-Command Course, the Warrant Officer Advanced Course, and soldiers from both active and reserve component units. Ultimately, five hundred ninety-six questionnaires were collected, analyzed, and correlated for this report.

Specific Test Design

The overall test design evaluated the effectiveness of AVTB as a collective task trainer of the BDP-identified deficiencies in a combined arms environment. The study covered the twelve-month period of March 11, 1993, through March 18, 1994, and was conducted in four phases. Four primary service school programs of instruction were selected: the U.S. Army Aviation Pre-Command Course (AVPCC), Aviation Officer Advanced Course (AVOAC), Aviation Officer Basic Course (AVOBC), and the Warrant Officer Advanced Course (WOAC). Excursionary iterations were authorized for Active and Reserve Component units. To assist in the overall test reliability, all AVTB device operators were provided standardized familiarization and qualification/certification training intended to place them on a level playing field. The qualification/certification courses were designed to accommodate three of Army Aviation's primary roles: scout (reconnaissance), attack, and air assault.

Phase One

The first phase of the test determined the appropriate application of AVTB in the Program of Instruction for Aviation Officer Professional Training, determined cost comparison factors, identified and isolated measures of effectiveness, and established baseline reference and comparative factors.

Phase Two

The second phase involved construction, tailoring, and refinement of the POI application through experiments with each population in each POI. Statistically representative numbers of each population were used to ensure application validity.

Phase Three

The third phase involved execution of the applications as trial runs using the previously identified measures of effectiveness and cost comparison factors.

Phase Four

The fourth phase required analysis and evaluation of test data and the publication of this, the final technical report.

Methodology

As with previous studies, selected BDS-D attributes were surveyed. Thirteen specific attributes were evaluated in terms of their impact--positive or negative--on collective training. Additionally, respondents were asked to determine which of the attributes were the best and which were the worst features of BDS-D.

Conclusions

Of the thirteen attributes surveyed, twelve were deemed to add or greatly add to the training experience by the majority of the respondents. In descending order of their impact, the attributes were: Interactive Threat, Engaging Targets, Realism, Realtime Simulation, Use of Artillery, Employing Weapons, Being Engaged or Shot Down, Acquiring Targets, Use of Air Defense Artillery, After Action Review, Flight Dynamics, and Out-The-Window Visuals. The remaining attribute, Close Air Support, was deemed to add or greatly add to the training experience by slightly less than half of the respondents. However, its value may not have been fairly judged, for reasons contained in the report section entitled "User Questionnaire Data Summary".

Best and Worst Features

When evaluating the same attributes in the context of best and worst features, the majority of the respondents believed the visual systems and the flight dynamics were definite weaknesses. A brief of each attribute follows.

Visual Systems

The current visual systems in the rotary and fixed wing devices provide roughly 78 degrees horizontal field of view and 35 degrees vertical field of view. Additionally, the terrain databases are not dynamic, and are constructed based on 125-meter resolution. Consequently, fields of view are restricted, and operator depth perception is lacking.

Flight Dynamics

The issue of fidelity relating to flight dynamics will generally prompt debate among even the most learned of individuals. In this author's opinion, the best answer to the question, "How much fidelity is enough?" is "It depends." It appears that cost

and fidelity are directly related, whereas reconfigurability and fidelity are inversely proportional. The existing aviation devices are reconfigurable, thus not intended to exactly represent any specific aircraft. They are designed to merely replicate the functions of shooting, moving, and communicating as a means of effective collective training. Within cited constraints, they perform well.

Training Value

In terms of training value, and notwithstanding the system's shortcomings, an overwhelming number of respondents (94%) believed that the AVTB provided meaningful training value.

Cost Comparison

Although designed based on a 60% solution (60% fidelity vice 100% fidelity), the current devices represent a tremendous monetary savings to the user. Comparing the hourly cost of operating one AVTB rotary wing device to the school-house hourly cost of operating an AH-64 for one hour yields a savings of 98.6%. Even after applying the 60% factor, a savings of 97.7% is realized. Based on 5,500 flying hours accumulated in the AVTB during this reporting period, the actual school-house costs would have been $16,045,700.00. Applying the 60% factor would reduce the cost to $9,627,420.00 while the AVTB cost was a mere $235,125.00. A greater disparity would exist were ammunition costs added to the equation. Actual costs of sophisticated weapons are astronomical. The AVTB provides unlimited ammunition with no increase in the hourly operating cost of the devices.
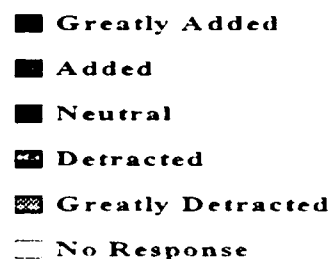
Detailed information concerning individual attributes, responses from the various population groupings, and cost comparison data are contained in the following pages.
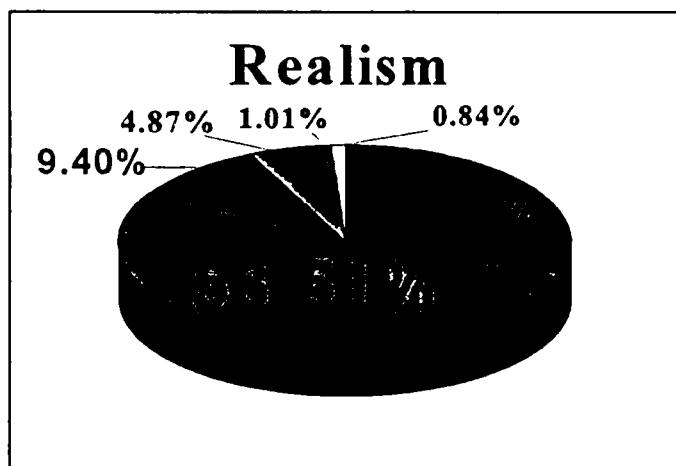
User Questionnaire
Data Summary

This summary covers data collected from the administration of User Questionnaire, Version 3.2, to students and unit personnel, during the period March 11, 1993, through March 18, 1994 Respondents included students from the Aviation Officer Advanced Course, the Aviation Officer Basic Course, and the Warrant Officer Advanced Course, and personnel from 2-4 Cavalry, 4-17 Cavalry, B/1-101 Aviation, and 1-238 Aviation (Michigan Army National Guard) A total of 596 questionnaires were correlated during Phase IV.

Respondents were first asked to rate the Battlefield Distributed Simulation technology in a number of specific areas, based on a numerical scale of one to five, as defined below. Respondents were instructed to give as answers only whole numbers in the range of one to five. In some cases, respondents failed to enter a rating for a given area. The incidence of this was statistically insignificant, except in the areas of Use of Close Air Support and Stealth/Playback Support for AAR. This can be explained by the fact that those two areas are ones to which not all users are exposed; many respondents indicated that they had not dealt with one or both of those areas.

■ **Greatly Added**

■ **Added**

■ **Neutral**

▨ **Detracted**

▨ **Greatly Detracted**

▬ **No Response**

Legend

REALISM

Realism

4.87% 1.01%   0.84%

9.40%

When rating the realism of the BDS-D technology, as seen in Figure 1, over 83% of them responded favorably--that the realism of the system either "greatly added" or "added" to the training experience. Less than six percent responded negatively, feeling that the system either "detracted" or "greatly detracted" from the experience. This would indicate that, although the generic rotary wing devices are not at the fidelity level of combat mission simulators and flight simulators, the users are able to immerse themselves in the virtual environment, and function as they would in the real world.

REAL TIME

The ability of BDS-D to reflect real-time constraints within the virtual world was considered by the users to be a highly positive aspect of the system. Over 83% of users responded favorably, with only less than three percent responding negatively. User comments reflected that the system is a good training tool for the staff and commander. The non-notional, real-time nature of the system forces the user to employ the appropriate tactical planning methods and allows the exercising of battlefield synchronicity--the employment of the various battlefield operating systems to achieve an operational objective.

Events Occurring in Real Time

1.68%   0.84%   1.34%

13.09%
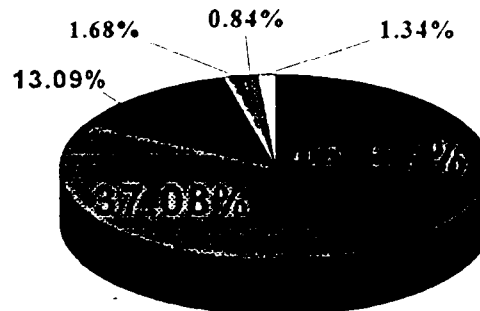
INTERACTIVE THREAT

Interactive Threat

1.34%   0.34%   2.01%

5.87%
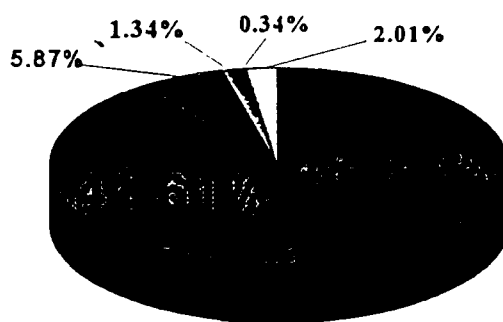
Another area which generated overwhelmingly positive responses was that of "Interactive Threat"--the use of computer-generated, semiautomated forces. As shown in Figure 3, over ninety percent of the users stated that the use of an interactive threat either "added" or "greatly added" to the training experience. The ability of the Threat forces to move, shoot, and communicate with their human supervisor was used throughout the tactical scenarios. In addition, the ability of the Semiautomated Forces software to portray a large variety of Threat arrays, to adapt (through human intervention) to a changing tactical situation, and to allow attenuation of Opposing Force lethality, was reflected in numerous user comments. The Aviation Test Bed uses Open-Architecture SAF (version 4.3.6).

- ■ Greatly Added
- ■ Added
- ■ Neutral
- ■ Detracted
- ▩ Greatly Detracted
- ☐ No Response
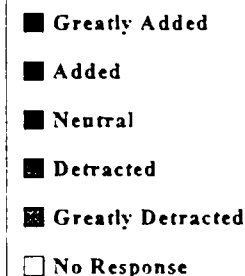
ACQUIRING AND ENGAGING TARGETS

The response of the users when queried about the [...] capabilities of the system was also highly positive. Seventy-[...] ability of BDS to exercise Acquiring Targets either "added" [...] exercise, while over 84% of them responded positively on Engaging [...] were less than four percent, in the case of Acquiring Targets and [...]

Acquiring Targets

11.74%   2.68%   1.01%   6.04%

41.38%

Engaging Targets

2.01%   0.17%   3.86%

9.90%
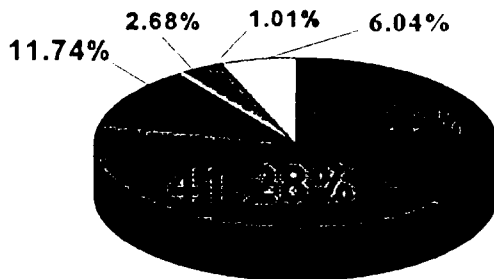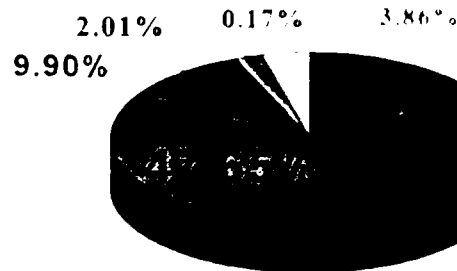
BEING ENGAGED AND/OR SHOT DOWN

The converse aspect of target acquisition and engagement, that of Being Engaged and/or Shot Down, was favorably viewed by 78.7% of respondents. This is arguably a strong endorsement of the system capabilities in this area, given that no one likes to be on the receiving end of a bullet--even in the virtual world. Negative responses were slightly over seven percent, with 10.74% neutral responses.

Being Engaged/Shot Down

5.37%   1.68%   3.52%

10.74%
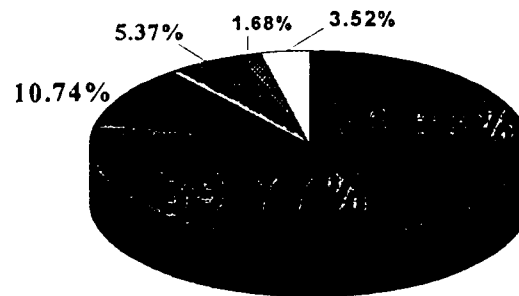
FIRE SUPPORT SYSTEMS

Use of Artillery and Close Air Support

The ability of BDS to integrate fire support and fixed wing assets into the tactical scenario was well received by users, with over eighty percent responding favorably with regard to the Use of Artillery, while 65% responded favorably on the Use of Close Air Support. Negative responses were 4.36% for "Use of Artillery", and 15.1% for "Use of Close Air Support". Over 15% of the users also failed to respond in the case of "Use of Close Air Support." When correlated with the user comments, the reasons for the relatively low acceptance ratings and unusually high "No Response" incidence were apparent.

Use of Artillery

3.69% 0.67% 2.01%

13.59%

With regard to the high incidence of "No Response", review of tactical scenario materials and user comments revealed that many users had no opportunity to assess the system's CAS capabilities. In many cases, CAS was not used to support the specific tactical scenario in use; in other cases, the users did not see any evidence of CAS, or were unaware of its operation.

Currently, Close Air Support is portrayed in BDS through the use of the MCC-supported CAS workstation. Both the relatively low ratings and lack of response can be traced to a significant shortcoming of this system. The MCC CAS workstation does not project an aircraft onto the terrain database; the only visible or audible manifestation of CAS in the virtual world is the explosion of the bomb.

Use of CAS

0.50%

3.36% 14.60%

34.90%

According to a number of user comments, users attempted to use Close Air Support, but since it failed to produce the audible and visual cues they expected--the sound and sight of a fixed-wing aircraft going overhead--they assumed that CAS was not present or working, and discontinued their efforts. It was impossible for the user to distinguish the only visible or audible cue--the explosion of the bomb--from the other explosions resulting from artillery or direct fire, also occurring on the database. A commonly-used workaround for this problem is to integrate CAS into tactical play either through the inclusion of a fixed-wing cockpit, or the use of semiautomated forces fixed-wing aircraft. These methods require more manpower and resources, but produce the appropriate audible and visual cues for the user-participant in the virtual world.
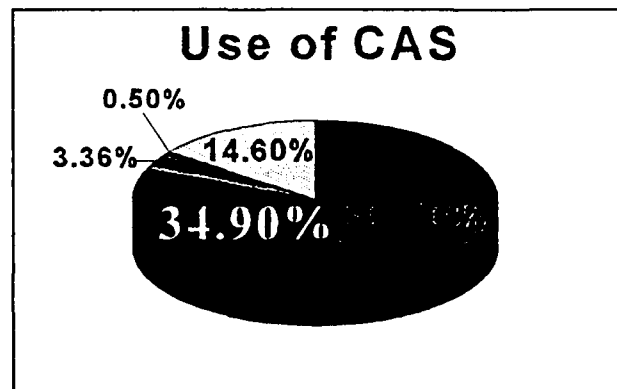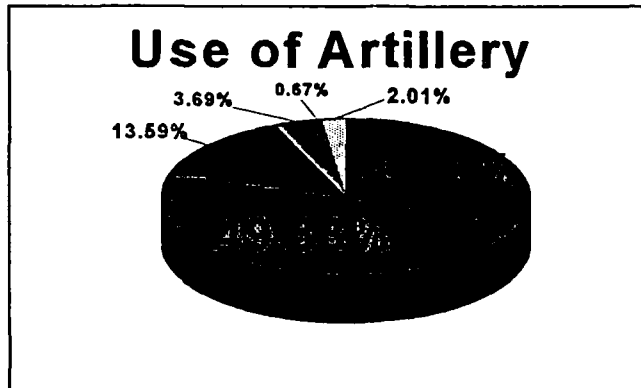
EMPLOYING ON-BOARD WEAPONS SYSTEMS

Users responded favorably when queried about the capabilities of BDS-D in exercising employment of on-board weapon systems. Over 78% felt that this "added" or "greatly added" to the training. Negative responses were registered from less than four percent of the users. It should be noted that some variance exists in the experiential base of the users, inasmuch as not all users employed the same weapons systems. The generic rotary wing devices can emulate any of a wide variety of rotary wing aircraft. Within the context of a tactical scenario, this means that some users may be flying devices emulating OH-58 Kiowas (-C or -D model), while others may be in devices emulating either AH-64 Apache or AH-1 Cobra attack helicopters. Flight dynamics, however, do not change.

Employing Weapons

2.35% 1.01% 5.87%

11.91%

■ Greatly Added
■ Added
■ Neutral
■ Detracted
■ Greatly Detracted
☐ No Response
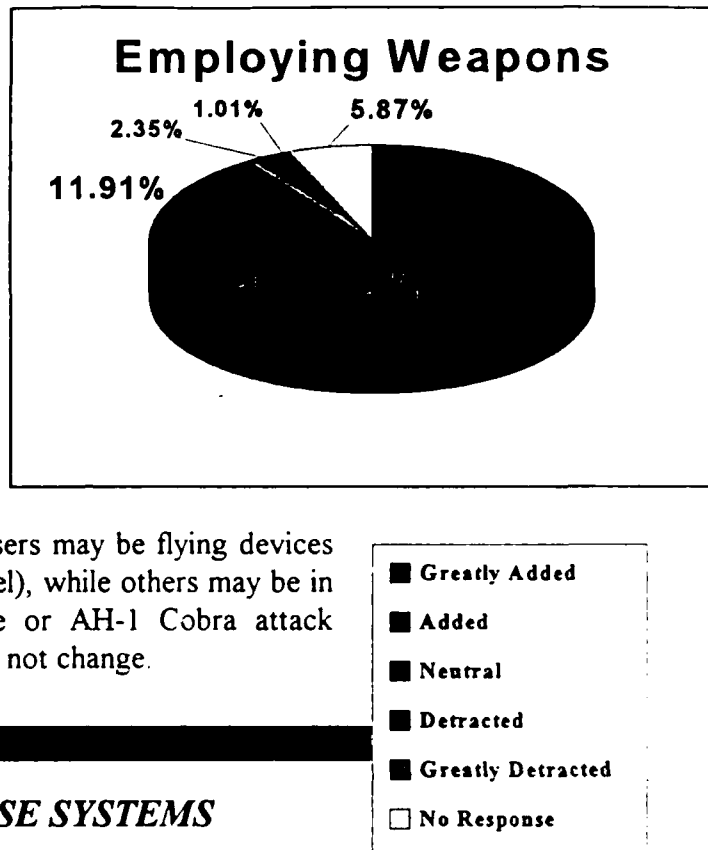
IMPACT OF AIR DEFENSE SYSTEMS

Users were asked to rate the impact of air defense systems within BDS. This question is necessarily linked to their assessment of semiautomated forces, since all air defense systems used in the tactical scenarios were computer-generated forces. Over 76% of users felt that the ability to dynamically portray a wide array of air defense systems impacted favorably on the exercise, while less than five percent felt it impacted negatively. Users commented that having a "real-feeling" anti-air threat was excellent, forcing them to employ proper tactics, techniques, and procedures.

Impact of ADA

4.19% 0.50% 6.38%

12.08%
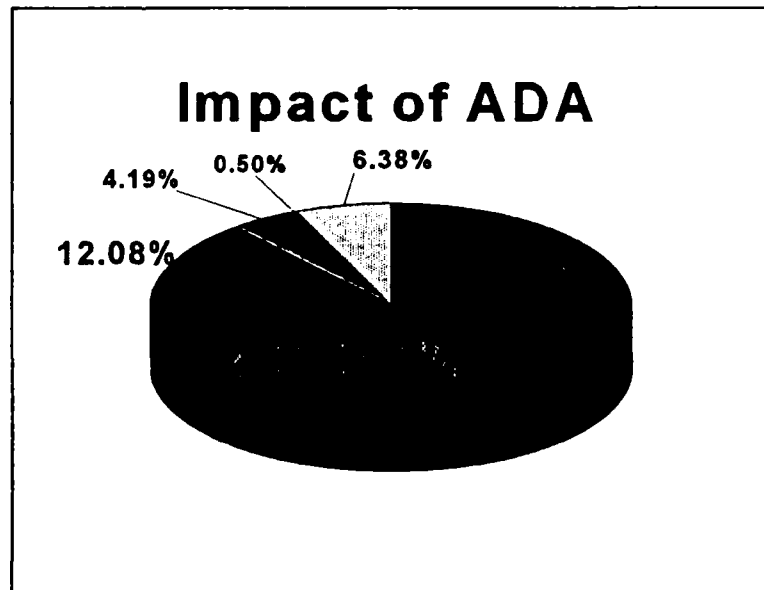
USE OF THE STEALTH DEVICE AND INTERACTIVE PLAYBACK

The capabilities in supporting the After Action Review were favorably received by 62% of the users, with only two percent negative comments. The unusually high incidence of "No Response" on this area, can be explained by the fact that not all groups used the stealth or playback capabilities in the conduct of their AARs.

The Stealth Device was used during tactical exercises and during interactive playback, as an observation platform for trainers and small group instructors. Interactive playback was conducted using the TableLogger function of SAF 4.3.3 software.

Stealth/Playback

0.84%
1.17%
16.95%
19.13%
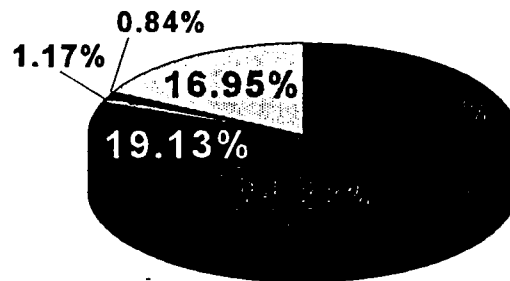
TRAINING VALUE AND REALISM

Respondents were also asked to rate the system's overall effectiveness in the areas of Training Value and Realism. Over ninety percent of users responded favorably with regard to the training value of BDS-D--rating it "Good" to "Excellent". Approximately 86% of users responded positively with regard to the overall realism of the system. Negative comments were limited to 1.18% for Training Value, and none for Realism.
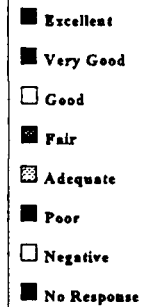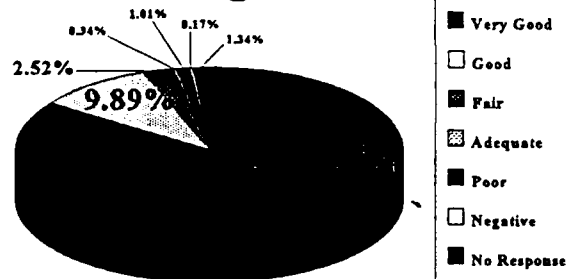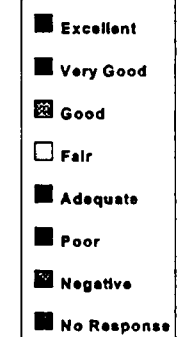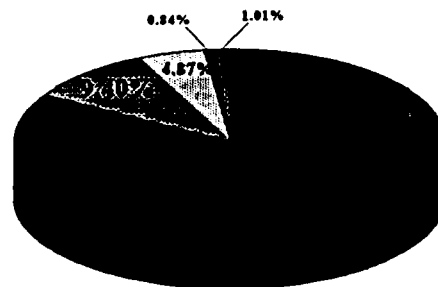
"The best collective training available for aviation."
User Comment

Training Value

2.52%
1.01%
0.34%
0.17%
1.34%
9.89%

- Excellent
- Very Good
- Good
- Fair
- Adequate
- Poor
- Negative
- No Response

Realism

0.84%
1.01%
4.87%

- Excellent
- Very Good
- Good
- Fair
- Adequate
- Poor
- Negative
- No Response

COMPARISON WITH OTHER SIMULATIONS

When asked to compare BDS-D with other collective training simulations, over two thirds of the respondents gave favorable ratings to BDS-D, stating that it was "Better" or "A Lot Better" than other collective training simulations which they had used.

Significantly, only 3.36% of the users compared BDS-D unfavorably with other collective simulations. A number of respondents (over 21%) either did not respond, or stated that they had had no experience with other computerized collective training simulations.

Comparison To Other Collective Training Simulations

- A Lot Better
- Better
- The Same
- Worse
- A Lot Worse
- No Response/ Not Applicable

0.17%
3.19%
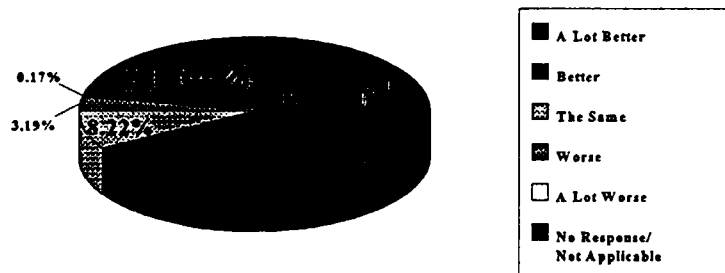
COMPARISON WITH LAST FIELD TRAINING EXERCISE (FTX)

Slightly over half of the users (53%) rated BDS-D better than their last FTX. Negative responses were slightly over ten percent. Many respondents didn't answer this question, several stating that they did not feel that simulation could be compared with real-world training. Another reason for non-response is suggested when responses are examined by a demographic breakdown of user.

Comments indicated those favoring the BDS-D environment for training did so for several reasons. First, the virtual environment allowed a scope of maneuver and an exercise of operational planning not normally feasible in the real-world environment. Second, the virtual environment eliminated some of the non-tactical distractors from training.

Comparison With Last Field Training Exercise

- Better
- The Same
- Worse
- No Response/ Not Applicable

21.81%
10.74%
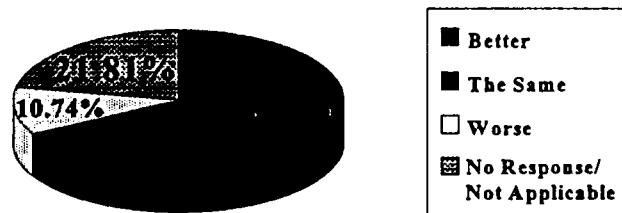
DID BDS-D HELP TO ACCOMPLISH THE TRAINING OBJECTIVE?

Respondents overwhelmingly ageed that BDS-D had helped to accomplish their training objective--with over 94% answering favorably. Negative responses were less than three percent. This highly favorable response was consistent with data gathered in previous phases of the Training Development Study.

Help Accomplish Training Objectives

2.68%   2.85%

- Yes
- No
- No Response
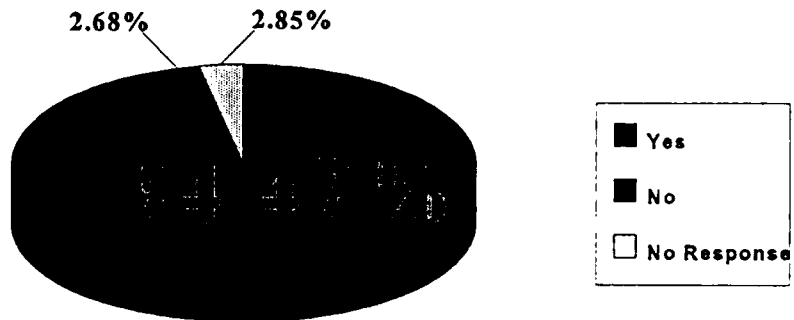
OVERALL EFFECTIVENESS OF BDS-D

When asked to rate the overall effectiveness of BDS-D, over ninety percent responded favorably, indicating that BDS-D had "Helped A Lot" or "Helped A Little". Slightly over three percent felt that the system either did not help, or had detracted from training.

Overall Effectiveness

2.52%   0.69%   5.97%

26.21%

- Helped A Lot
- Helped A Little
- Did Not Help
- Detracted From
- No Response
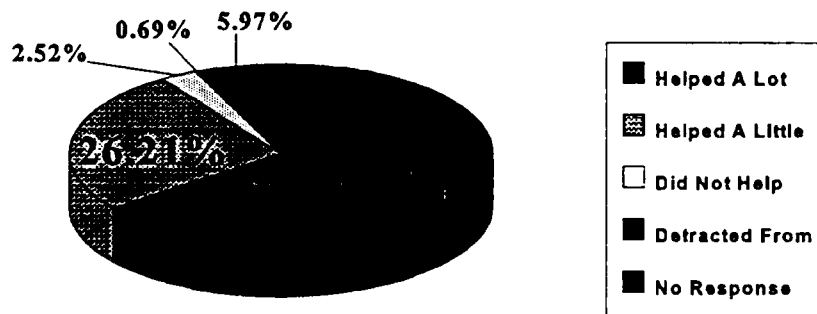
BEST AND WORST FEATURES OF BDS

All respondents were asked to select what they felt were the Best feature or features, and the Worst feature or features of BDS. As shown in the figure below, virtually all features were chosen as Best Features of BDS in the great preponderance of cases.   There were three exceptions to this.
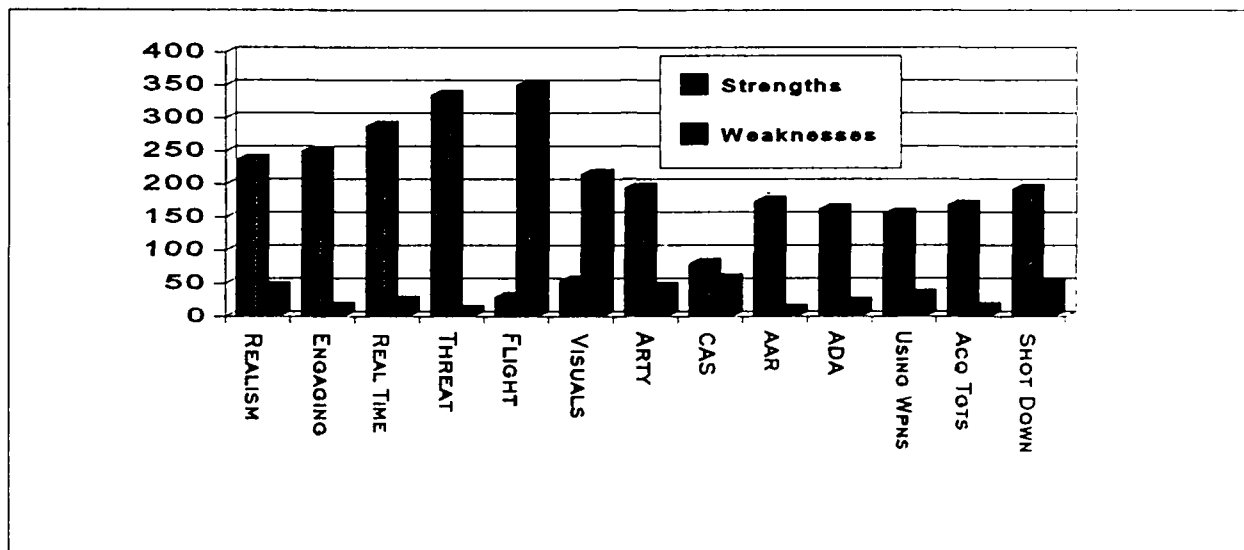
Close Air Support was chosen as a Worst Feature approximately as many times as it was chosen as a best feature. Flight Dynamics and Visual Fidelity were both chosen as Worst Features of BDS by users in overwhelming numbers.

Realism

When rating the Realism of the Battlefield Distributed Simulation-Developmental (BDS-D), all but one group reacted favorably - that the system "Greatly Added" or "Added" to the training. Forty-eight percent of the Aviation Warrant Officer Advanced Course rated the system favorably and 20% believed that the system "Detracted" or "Greatly Detracted from the training. The 1/238 Michigan Army National Guard gave the attribute a 93.8% favorable rating. Only 1.9% of the Active Duty Units reacted negatively - that the system "Detracted" or "Greatly Detracted" from the training.

Realism

Chart legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents

Categories (x-axis): Greatly Added To Training, Added To Training, Neutral, Detracted From Training, Greatly Detracted From Training, No Response
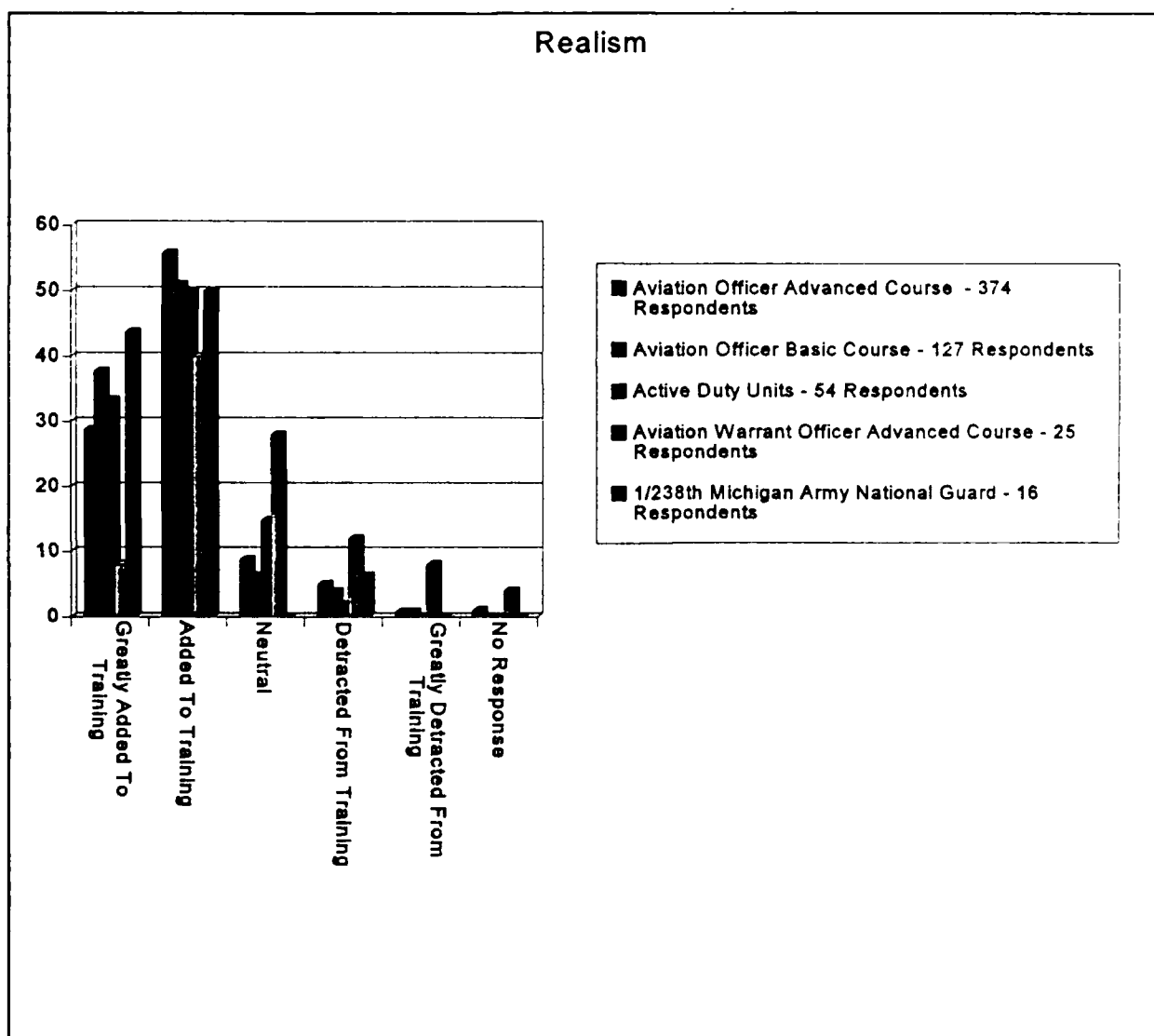
Engaging Targets

All five groups responded favorably when asked about the capabilities of BDS-D with respect to Engaging/Acquiring Targets. Over 89% of the Aviation Officer Advanced Course felt that this aspect "Greatly Added" or "Added" to the training. The group with the largest percentage of negative responses was the Aviation Warrant Officer Advanced Course. However, only 8% of them felt that the capability to Engage/Acquire Targets "Greatly Detracted" or Detracted" from the training.

Engaging Targets

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- *Active Duty Units - 54 Respondents*
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents

Categories: Greatly Added To Training, Added To Training, Neutral, Detracted From Training, Greatly Detracted From Training, No Response

Events Occurring In Real Time

The ability of BDS-D to reflect events occurring in Real Time was considered to be a highly positive attribute to the system. Eighty-nine percent of the Aviation Officer Advanced Course and the 1/238 Michigan Army National Guard felt that the Real Time capabilities of the system "Greatly Added" or "Added" to the training. The Aviation Warrant Officer Advanced Course rated it slightly less with a 72% favorable rating, however; none of the students in the group rated the Real Time attribute as a negative aspect.

Events Occuring In Real Time

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents

X-axis categories: Greatly Added To Training, Added To Training, Neutral, Detracted From Training, Greatly Detracted From Training, No Response

Interactive Threat

The responses to Interactive Threat - the use of computer generated semiautomated forces - were overwhelmingly positive   Over 89% of the Aviation Officer Advanced Course felt that the interactive threat "Greatly Added" or "Added" to the training. Four percent of the Aviation Warrant Officer Advanced course felt that the interactive threat "Detracted" while only .5% of the Aviation Officer Advanced Course felt it "Greatly Detracted" from the training.

Interactive Threat Elements

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents

X-axis categories: Greatly Added To Training, Added To Training, Neutral, Detracted From Training, Greatly Detracted From Training, No Response/Not Used

Flight Dynamics

The majority of the users queried felt that the Flight Dynamics neither added nor detracted from the training. Less than 38% of the Aviation Officer Advanced Course responded favorably - that the Flight Dynamics "Greatly Added" or Added" to the training. Eighty percent of the Warrant Officer Advanced Course responded negatively - that this attribute "Detracted" or "Greatly Detracted" from the training.

Flight Dynamics

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents
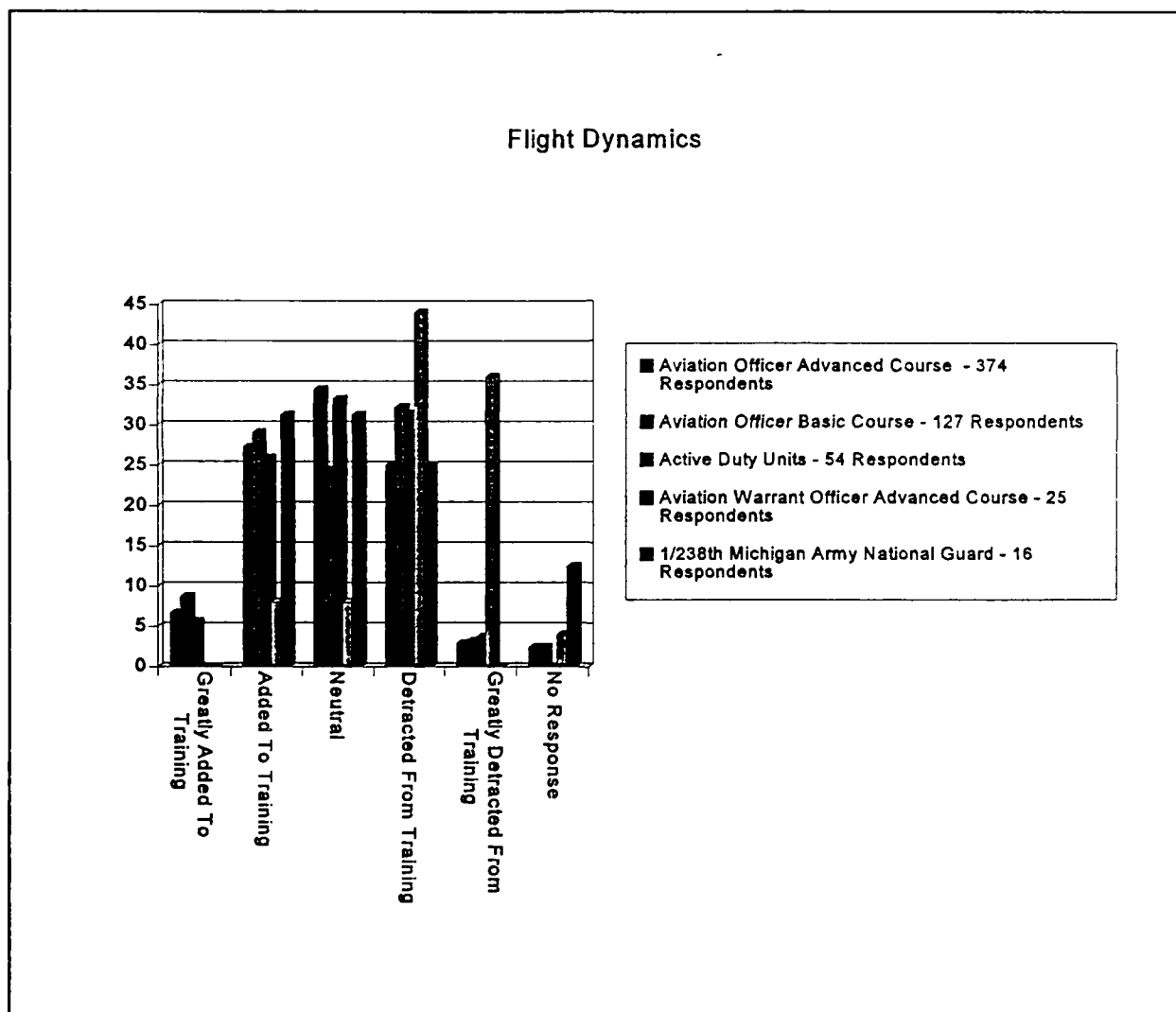
Visual Fidelity

The majority of the users queried felt that the Visual Fidelity of BDS-D "Added" to the training. The closest percentages fell in to the "Neutral" response with 28%, 23%, 26%, 28%, and 18% by the Aviation Officer Advanced Course, Aviation Officer Basic Course, Active Duty Units, Aviation Warrant Officer Advanced Course and the 1/238 Michigan Army National Guard respectively. The largest negative response came from the Aviation Warrant Officer Advanced Course with 56% feeling that the Visual Fidelity of the system "Detracted" or "Greatly Detracted" from the training.

Visual Fidelity

■ Aviation Officer Advanced Course - 374 Respondents

■ Aviation Officer Basic Course - 127 Respondents

■ Active Duty Units - 54 Respondents

■ Aviation Warrant Officer Advanced Course - 25 Respondents

■ 1/238th Michigan Army National Guard - 16 Respondents
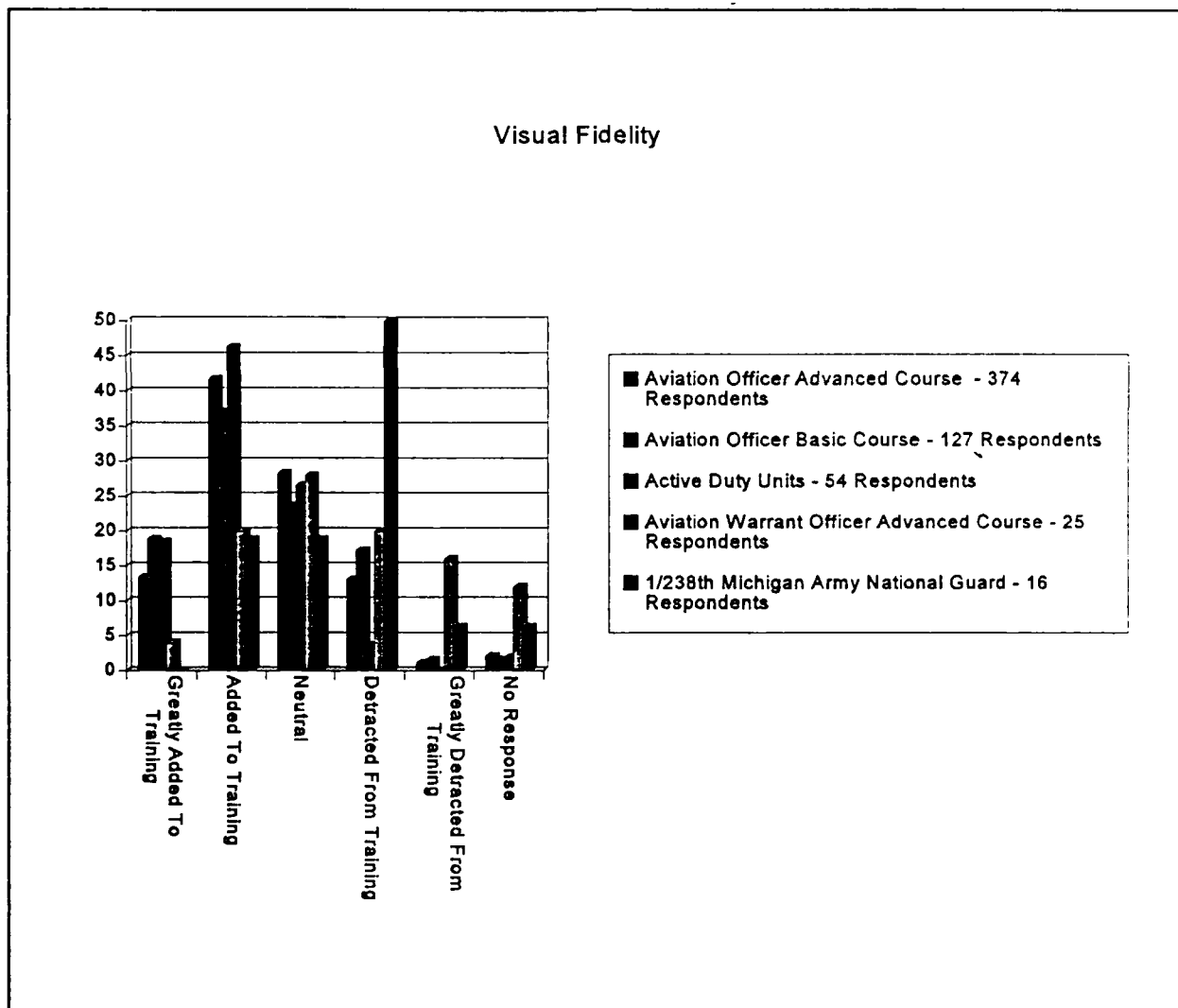
Use of Artillery

The Use of Artillery In BDS-D was also well received. Over 93% of the 1/238 Michigan Army National Guard stated that the Use of Artillery "Greatly Added" or "Added" to the training. Slightly over 9% of the Active Duty Units felt that the Use of Artillery only "Detracted" from the training.

Use Of Artillery

■ Aviation Officer Advanced Course - 374 Respondents

■ Aviation Officer Basic Course - 127 Respondents

■ Active Duty Units - 54 Respondents

■ Aviation Warrant Officer Advanced Course - 25 Respondents

■ 1/238th Michigan Army National Guard - 16 Respondents
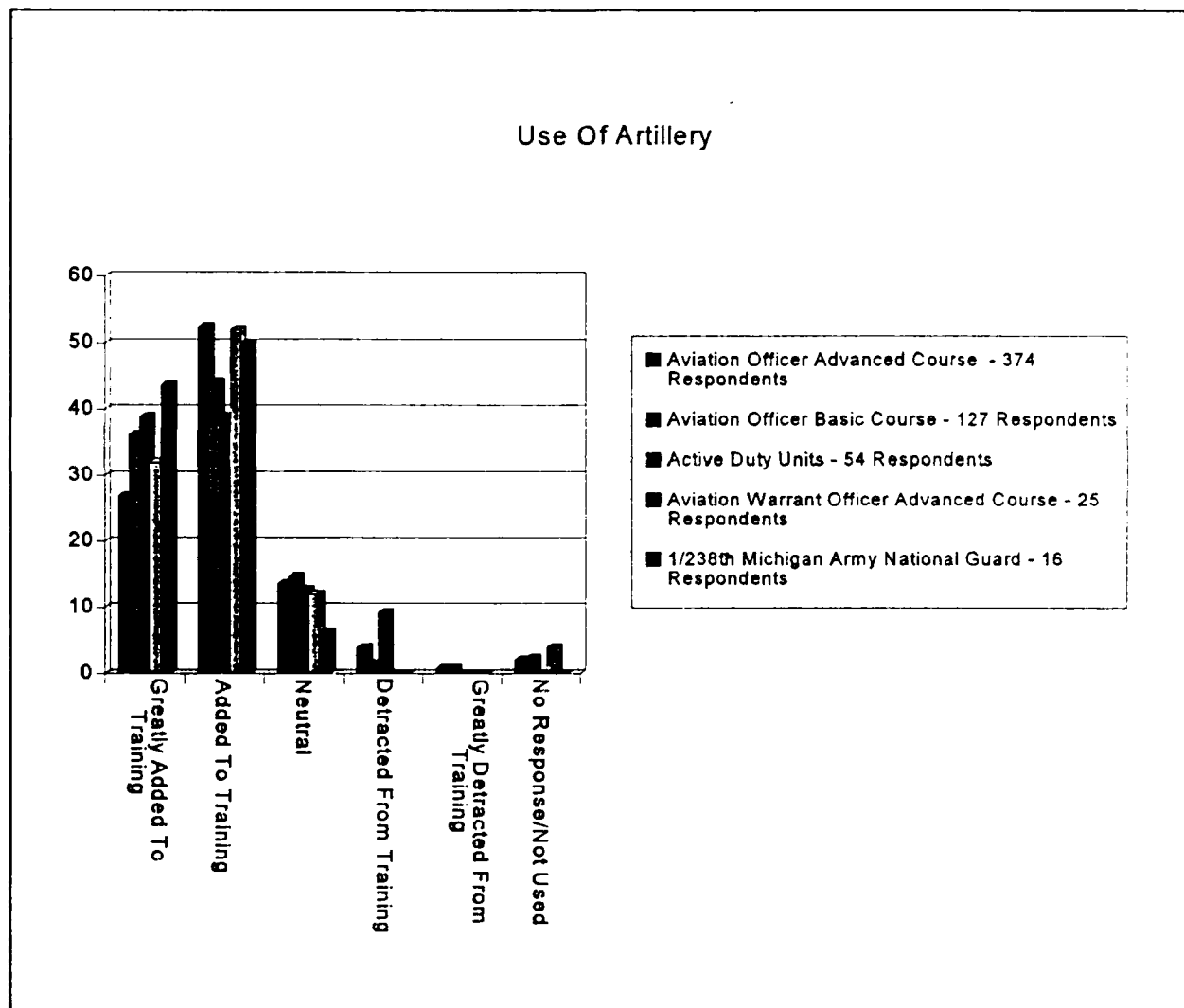
Use of Close Air Support

The Use of Close Air Support was also viewed as a positive aspect of BDS-D. Fifty-one percent of the Active Duty Units stated that Close Air Support "Greatly Added" or "Added" to the training while 76% of the Aviation Warrant Officer Advanced Course viewed it as "Neutral" or "Not Used". Of those responding, most did not view Close Air Support as detracting or greatly detracting to the training. Thirty-six percent of the Aviation Warrant Officer Advanced Course had "No Response" or stated that Close Air Support was "Not Used".

Use Of Close Air Support

- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents
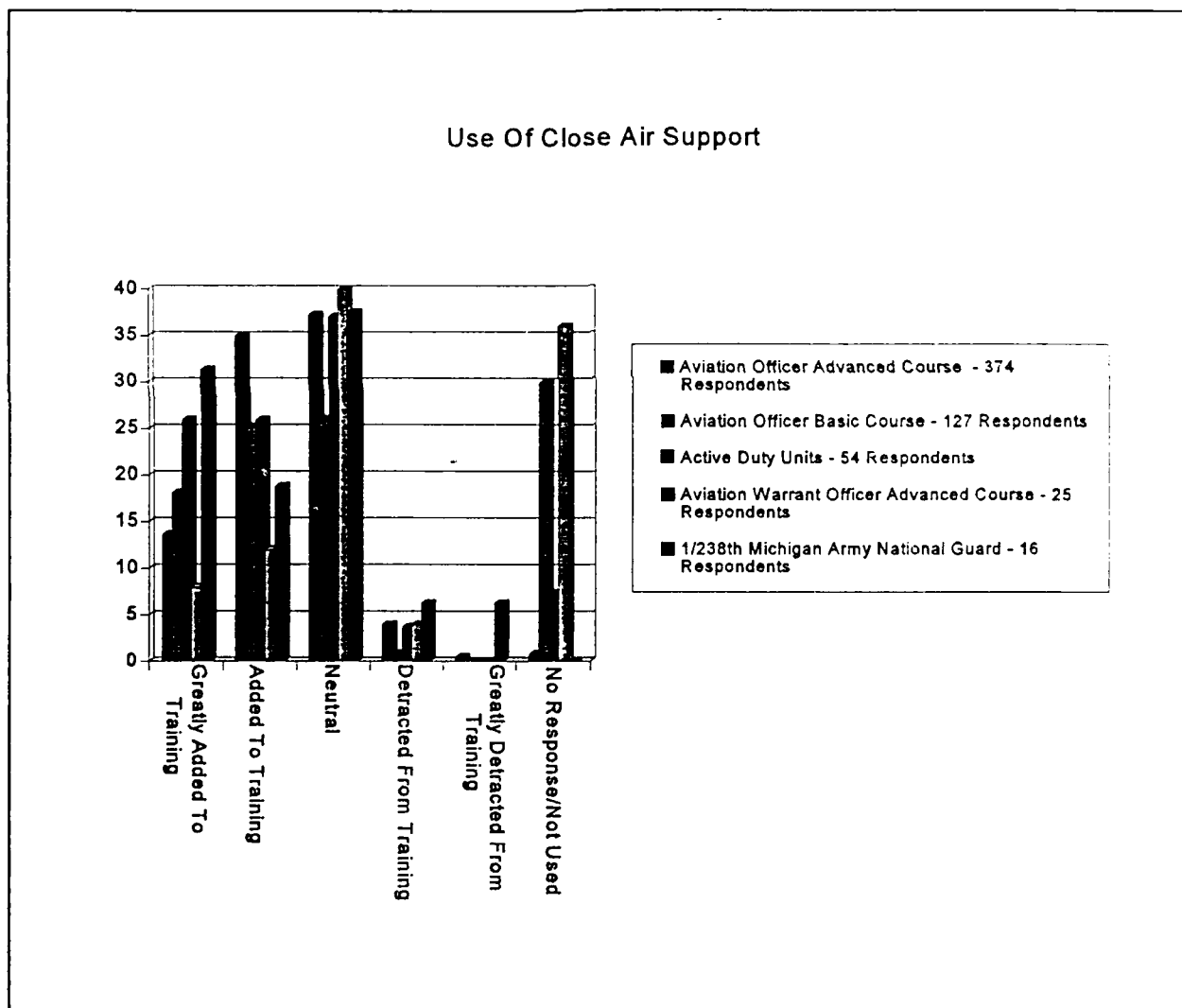
Use of Stealth /Playback In After Action Review

This attribute was viewed in much the same way as the Use of Close Air Support. One hundred percent of the 1/238 Michigan Army National Guard felt that the Use of the Stealth device and the interactive playback In After Action Review "Greatly Added" or Added" to the training. Ninety-three percent of the Active Duty Units felt this way also. Forty-nine percent of the Aviation Officer Basic Course responses were "Neutral" or "Not Used". This can be attributed to the fact that most of the Aviation Officer Basic Course Students were not exposed to this aspect of the system.

Use Of Stealth/Playback In After Action Review

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents

Categories (x-axis): Greatly Added To Training, Added To Training, Neutral, Detracted From Training, Greatly Detracted From Training, No Response/Not Used

Impact of Air Defense

Users responded favorably when asked about the Impact of Air Defense. Eighty-nine percent of the Active Duty Units felt that it "Greatly Added" or "Added" to the training, while less than 2% viewed it negatively.

Impact Of Air Defense

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents

Categories: Greatly Added To Training, Added To Training, Neutral, Detracted From Training, Greatly Detracted From Training, No Response/Not Used
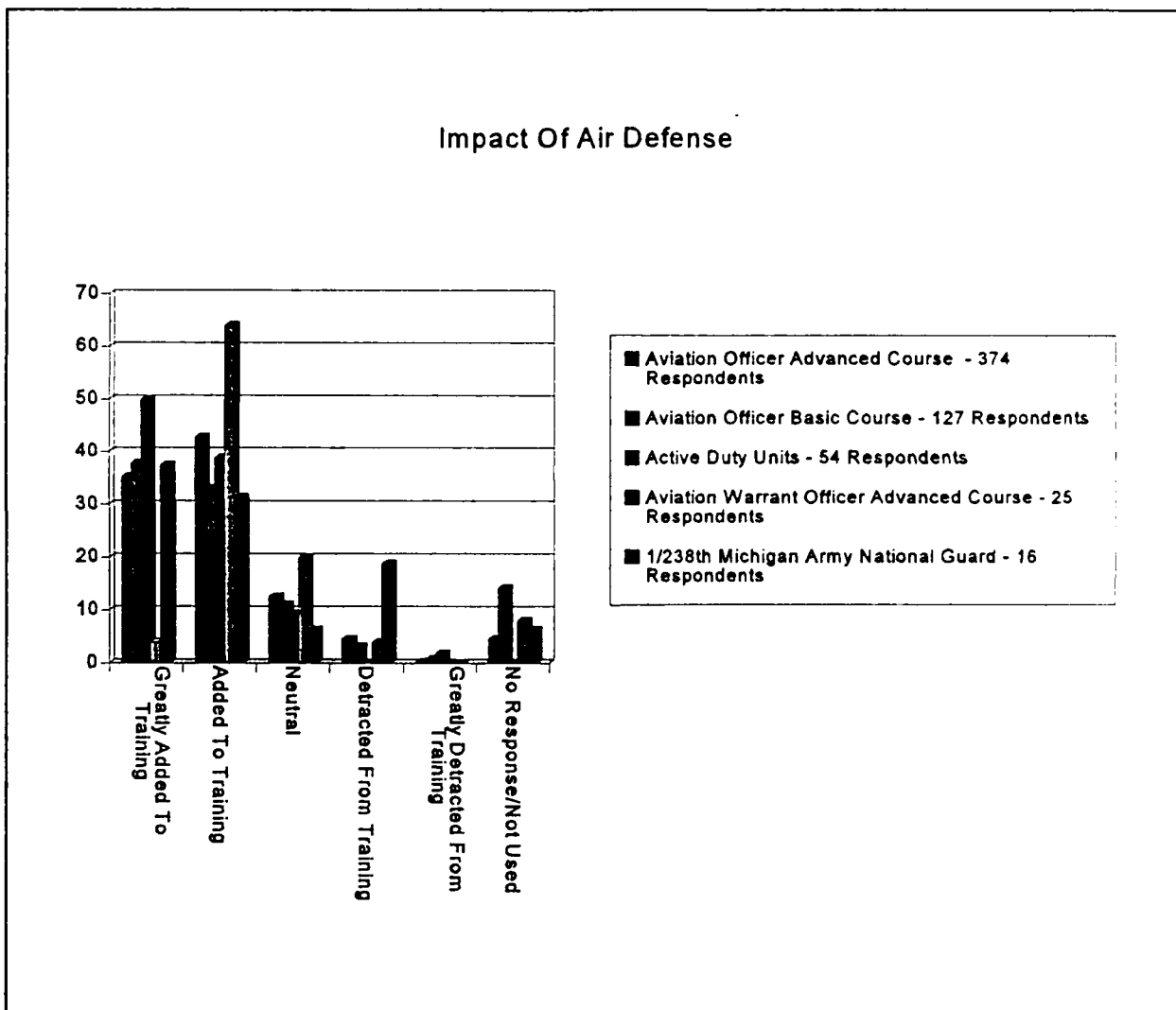
Employing On-Board Weapons Systems

Another area which generated very favorable response was that of Employing On-Board Weapons Systems. Eighty-six percent of the Aviation Officer Advance Course felt that it "Greatly Added" or "Added" to the training, while less than 2% viewed it negatively.

Employing On-Board Weapons Systems

■ Aviation Officer Advanced Course - 374 Respondents

■ Aviation Officer Basic Course - 127 Respondents

■ Active Duty Units - 54 Respondents

■ Aviation Warrant Officer Advanced Course - 25 Respondents

■ 1/238th Michigan Army National Guard - 16 Respondents
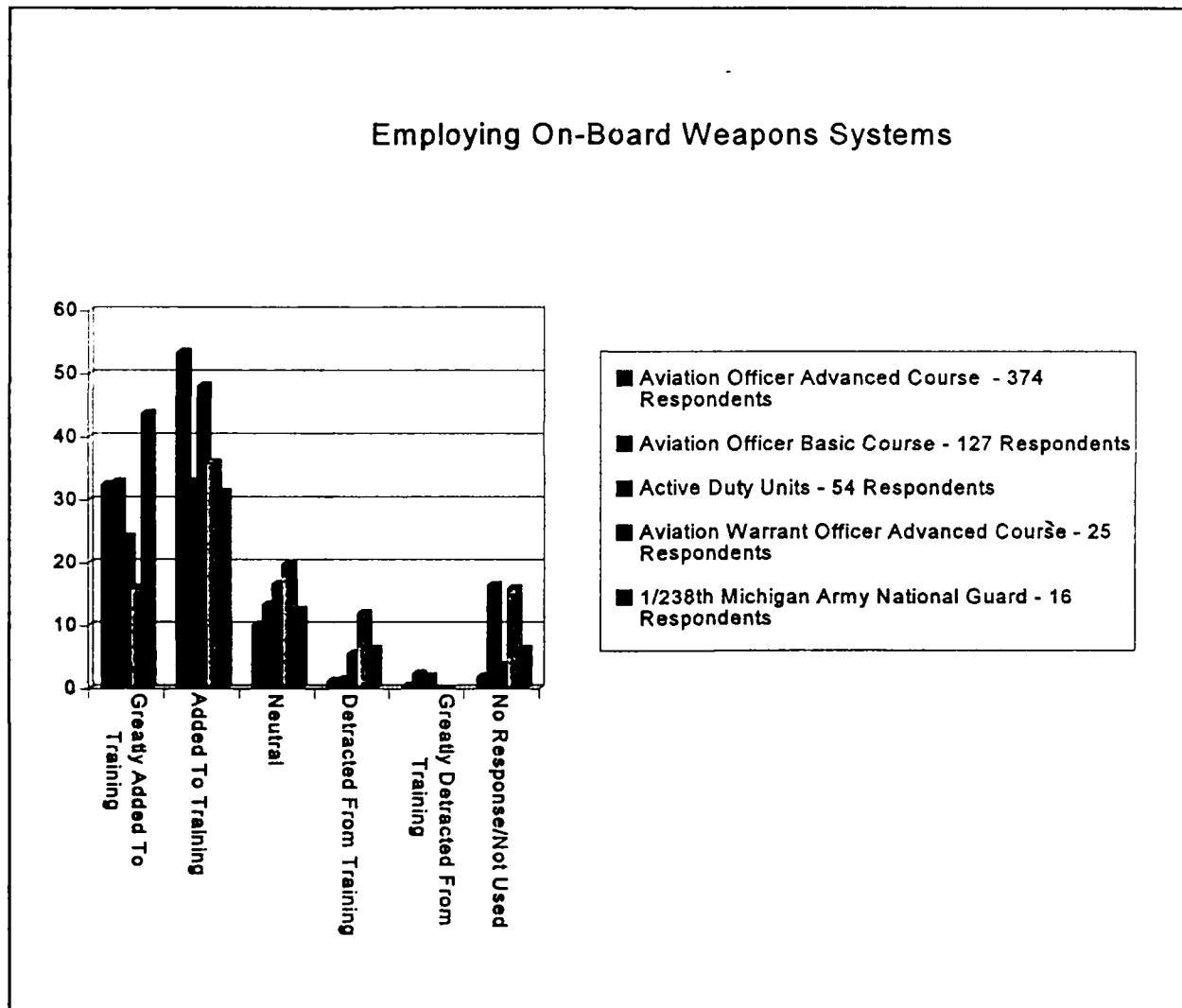
Acquiring Targets

All five groups responded favorably when asked about the Target Acquisition capabilities of the system. Eighty-six percent of the Aviation Officer Advance Course felt that the ability of the system in this regard "Greatly Added" or "Added" to the training. "Detracted" or "Greatly Detracted" responses varied from 2.7% of the Aviation Officer Advanced Course to 18.8% of the Aviation Warrant Officer Advanced Course.

Acquiring Targets

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents
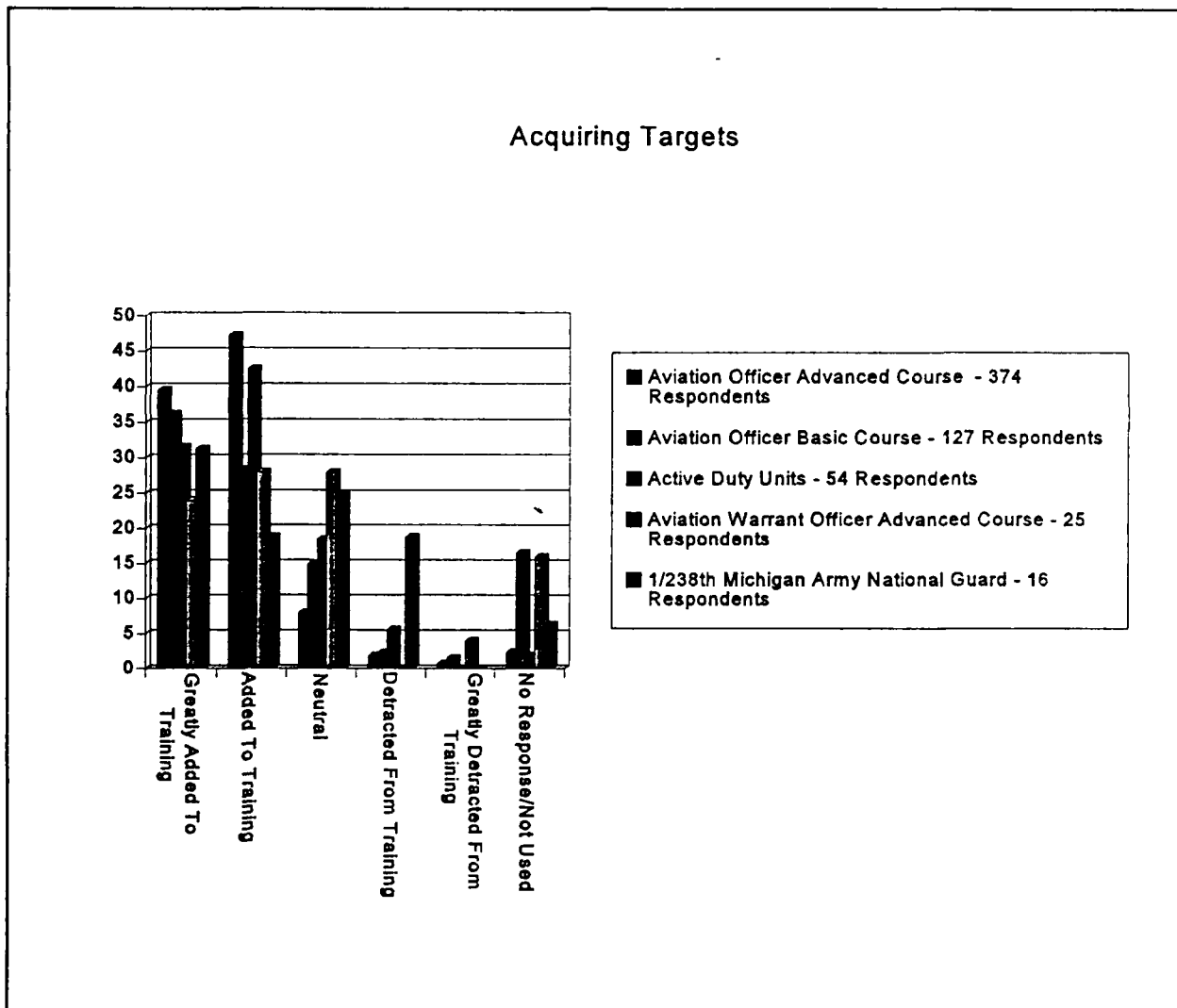
Being Engaged and/or Shot Down

When queried about Being Engaged and/or Getting Shot Down, most viewed this attribute favorably. Eighty percent of the Active Duty Units felt that it "Greatly Added" or "Added" to the training. The lowest favorable response was that of the Aviation Warrant Officer Advanced Course with a 56% favorable rating. The Aviation Warrant Officer Advanced Course also assessed it with an overall 16% negative rating feeling that this attribute "Detracted" or "Greatly Detracted" from the training.

Being Engaged/Getting Shot Down

- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents
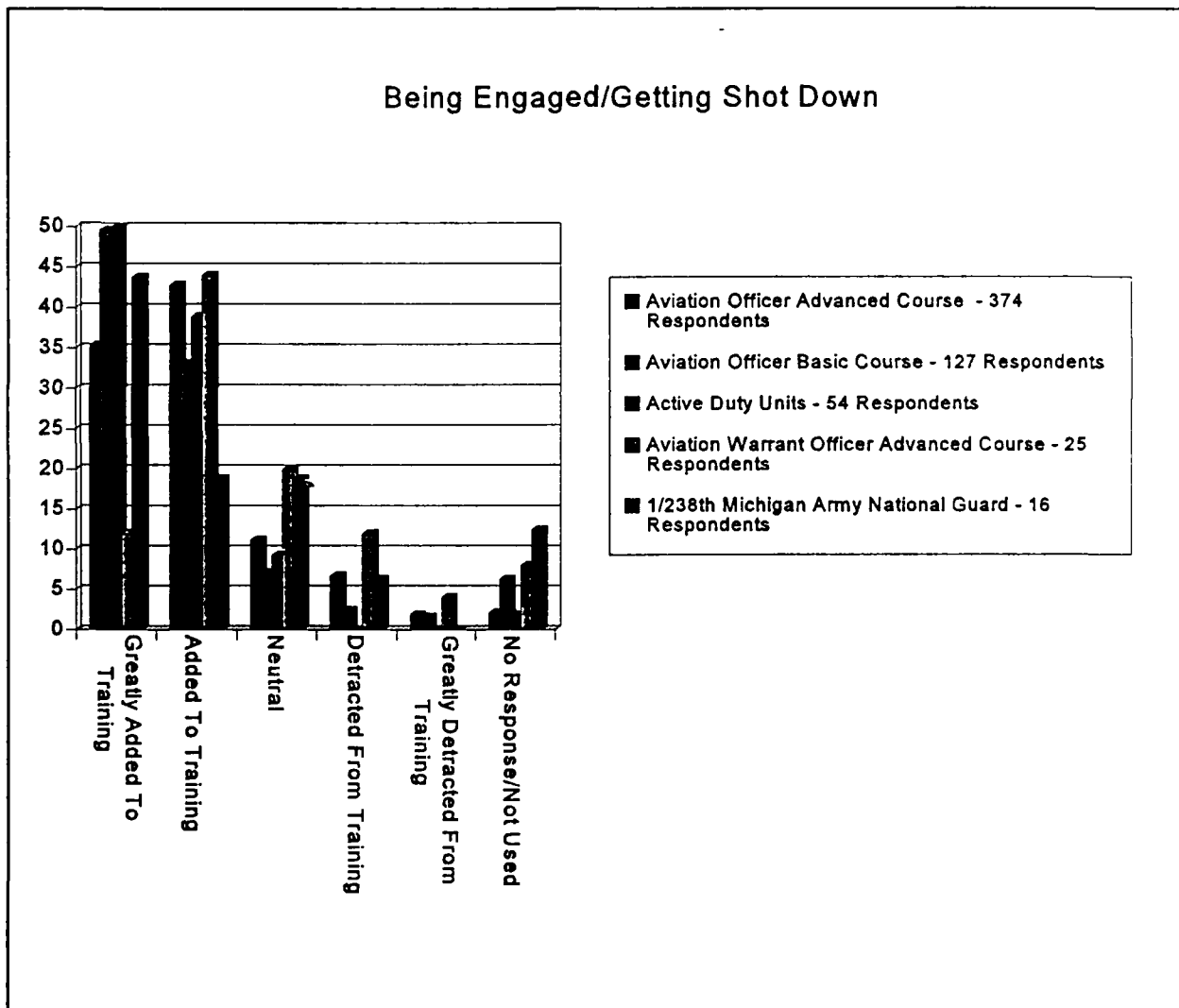
Overall Value with Respect to Collective Training

The overall value of BDS-D with respect to training was viewed very favorably ("Excellent", "Very Good", or "Good") by the respondents. One hundred percent of the Active Duty Units viewed the Overall Value with Respect to Collective Training favorably as did over 96% of the Aviation Officer Advanced Course. Less than 3% of the Aviation Officer Advanced Course gave a "Fair" or "Adequate" rating. In addition, the Aviation Officer Advanced Course was the only group that gave a "Poor" or "Negative " rating. Sixteen percent of the Aviation Warrant Officer Advanced Course viewed the system as "Fair" with no "Poor" or "Negative" responses.

Overall Value With Respect To Collective Training

■ Aviation Officer Advanced Course - 374 Respondents

■ Aviation Officer Basic Course - 127 Respondents

■ Active Duty Units - 54 Respondents

■ Aviation Warrant Officer Advanced Course - 25 Respondents

■ 1/238th Michigan Army National Guard - 16 Respondents
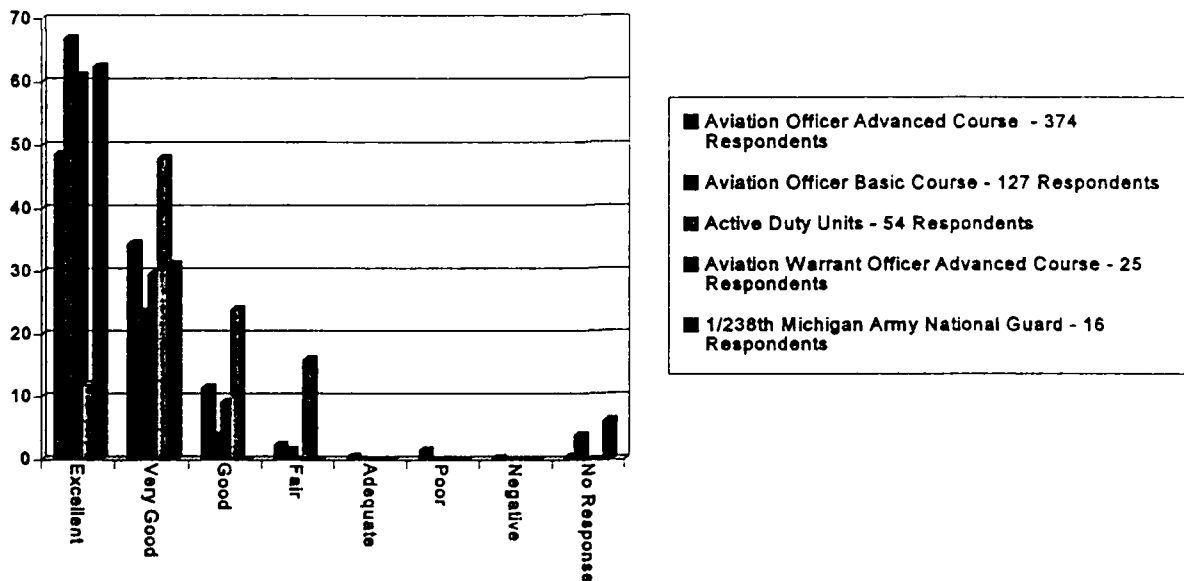
Overall Value with Respect to Realism

When asked to rate BDS-D with respect to realism, the results were highly favorable. Over 98% of the Active Duty Units and over 95% of the Aviation Officer Basic Course responded with a favorable ("Excellent", "Very Good" or "Good") rating. None of the respondents viewed the overall value with respect to realism as "Poor" or "Negative".

Overall Value With Respect To Realism

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents
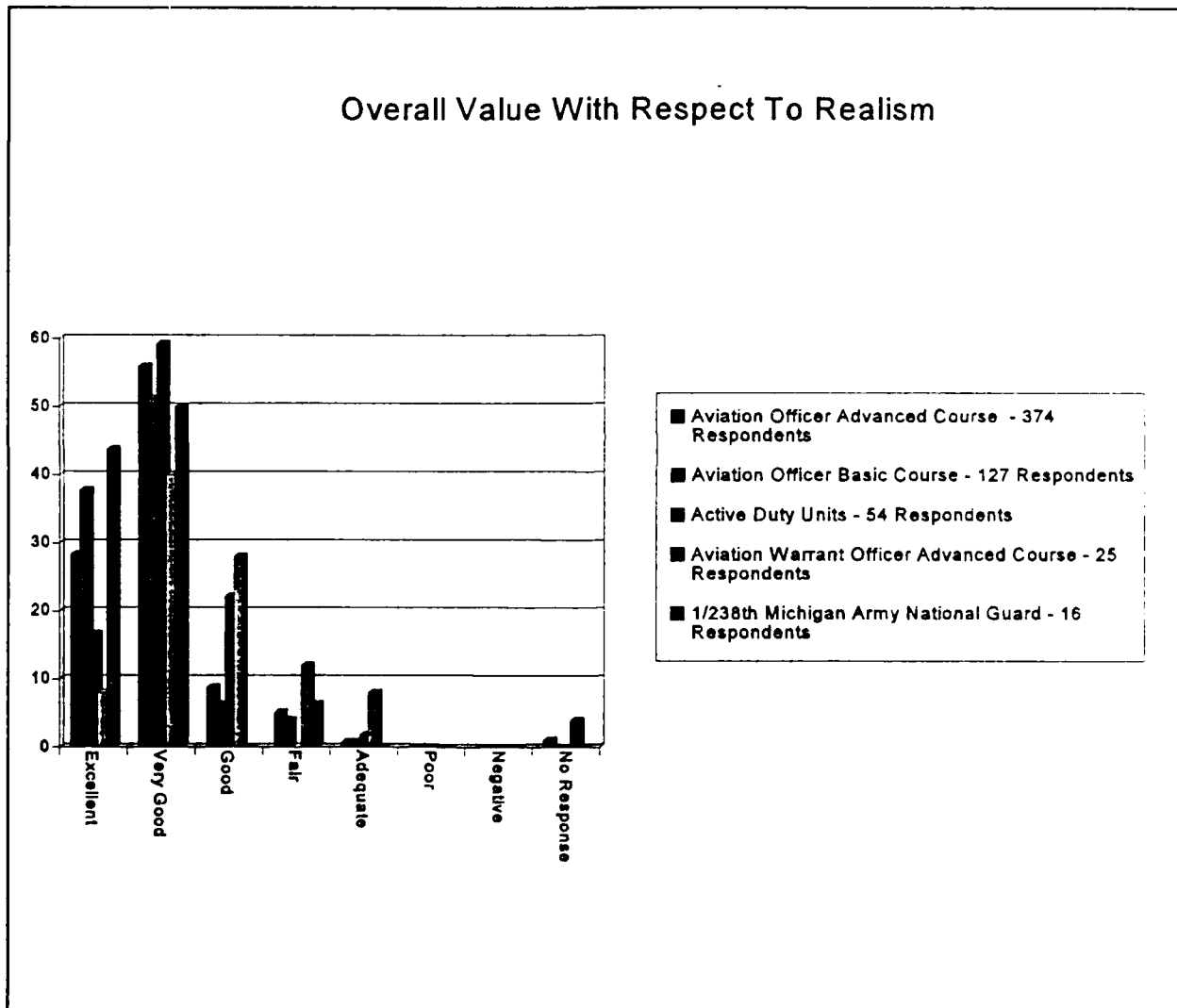
Compare BDS-D To Other Collective Computerized Simulators

When asked to compare BDS-D to other collective computerized simulators, the majority of the respondents viewed the system as "A Lot Better" or "Better". Eighty-one percent of the 1/238 Michigan Army National Guard gave BDS-D a favorable rating while only 28% of the Aviation Warrant Officer Advanced Course felt the attribute was "A Lot Better" or "Better". Also noted was the 56% "No Response/Not Applicable" response of the Aviation Warrant Officer Advanced Course which may account for the low favorable rating.

Compare BDS-D To Other Collective Computerized Simulators

- ■ Aviation Officer Advanced Course - 374 Respondents
- ■ Aviation Officer Basic Course - 127 Respondents
- ■ Active Duty Units - 54 Respondents
- ■ Aviation Warrant Officer Advanced Course - 25 Respondents
- ■ 1/238th Michigan Army National Guard - 16 Respondents
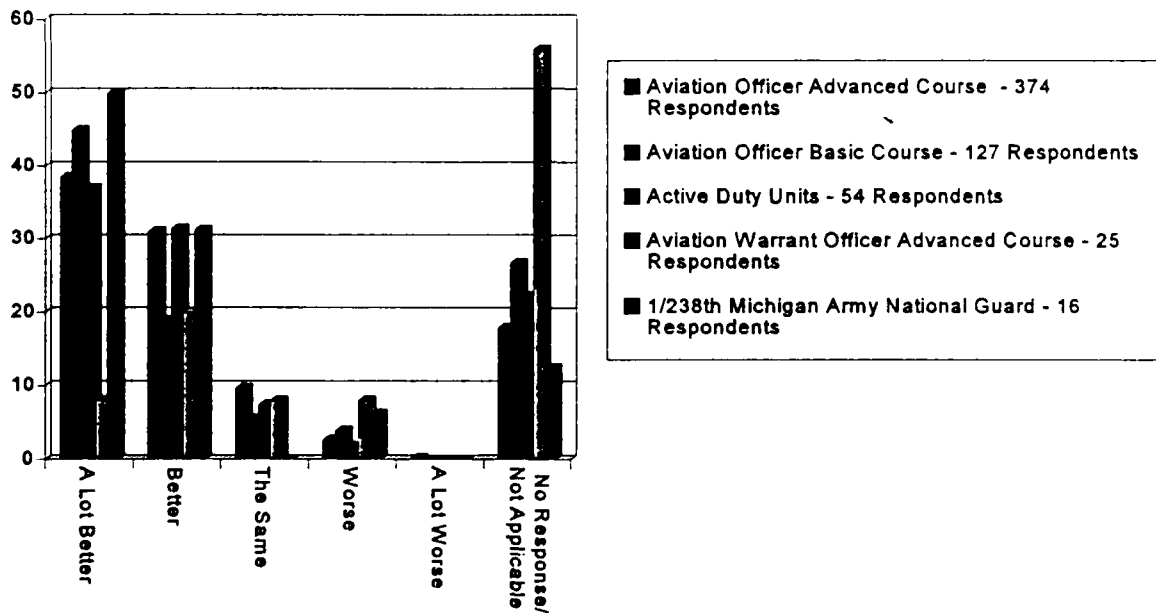
Compare BDS-D to the Last Field Training Exercise

When asked to Compare BDS-D to the Last Field Training Exercise, the majority of the responses were favorable - "Better". The Active Duty Units responded with over 70% feeling that BDS-D was "Better" than the last field training exercise in which they participated. Twenty percent of the Aviation Warrant Officer Advanced Course felt it was the "Same" while 24% of them felt it was "Worse". It was obvious that many of the Aviation Officer Basic Course students had not participated in an FTX when nearly 30% did not respond or felt it was "Not Applicable" to them.

Compare BDS-D To The Last Field Training Exercise

- ■ Aviation Officer Advanced Course - 374 Respondents
- ■ Aviation Officer Basic Course - 127 Respondents
- ■ Active Duty Units - 54 Respondents
- ■ Aviation Warrant Officer Advanced Course - 25 Respondents
- ■ 1/238th Michigan Army National Guard - 16 Respondents
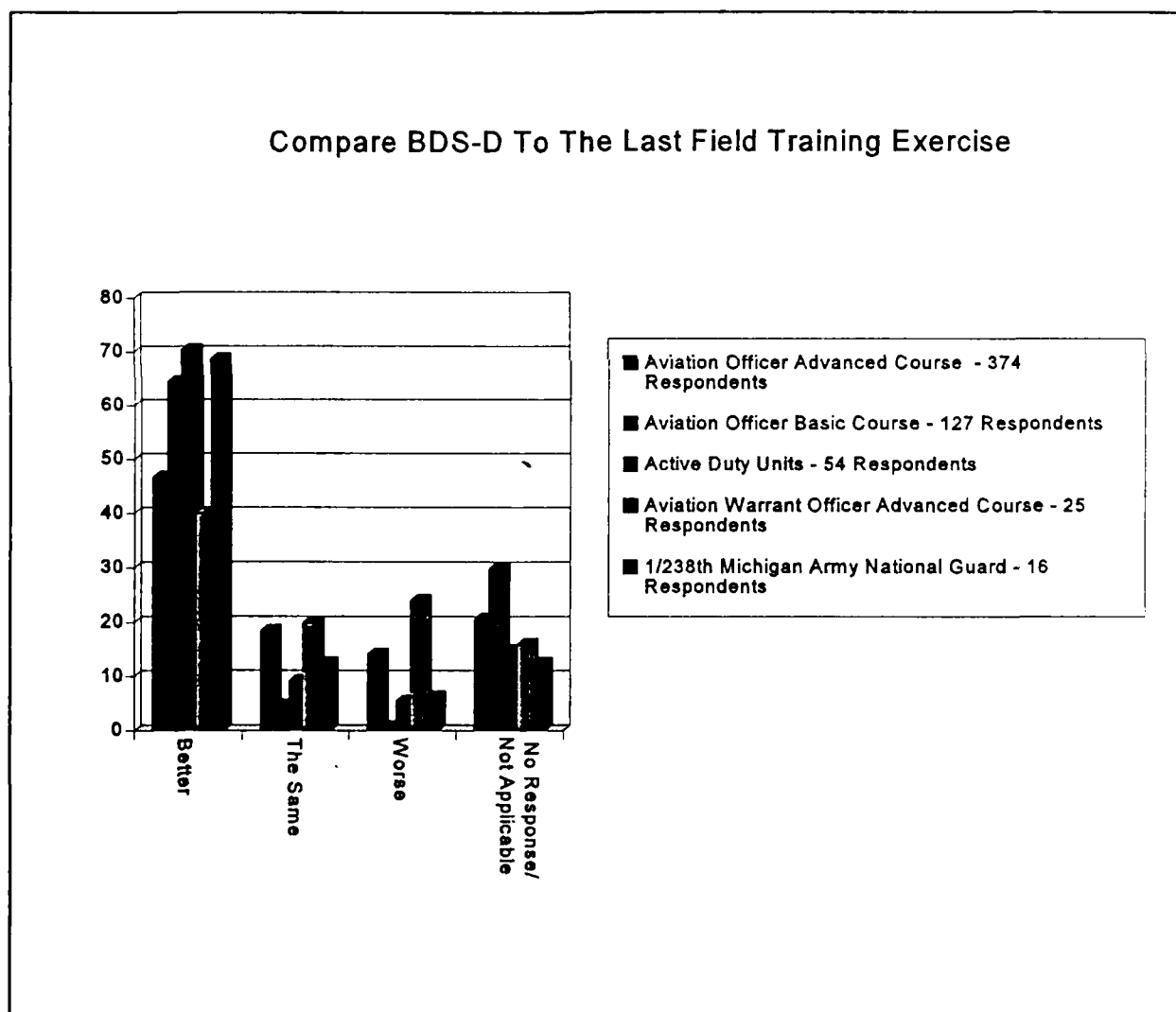
Did BDS-D Help Accomplish the Training Objectives?

When the respondents were asked if BDS-D helped accomplish the training objectives, an overwhelming amount said "Yes". One hundred percent of the Active Duty Units and nearly 95% of the Aviation Officer Advanced Course responded in the affirmative.

Did BDS-D Help Accomplish The Training Objectives?

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents
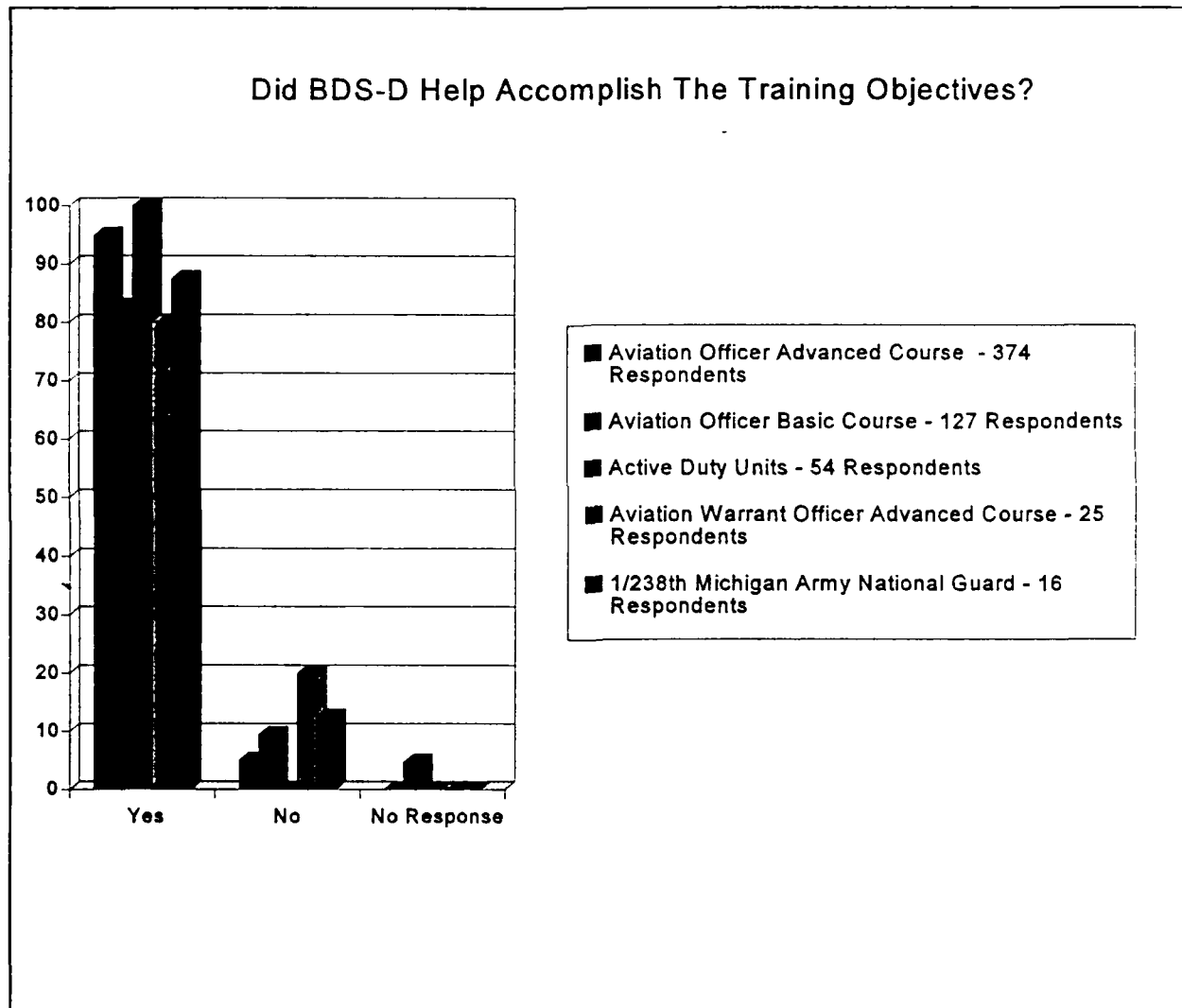
Overall Effectiveness

When asked to evaluate the overall effectiveness of BDS-D, there was again an overwhelming positive response. The 1/238 Michigan Army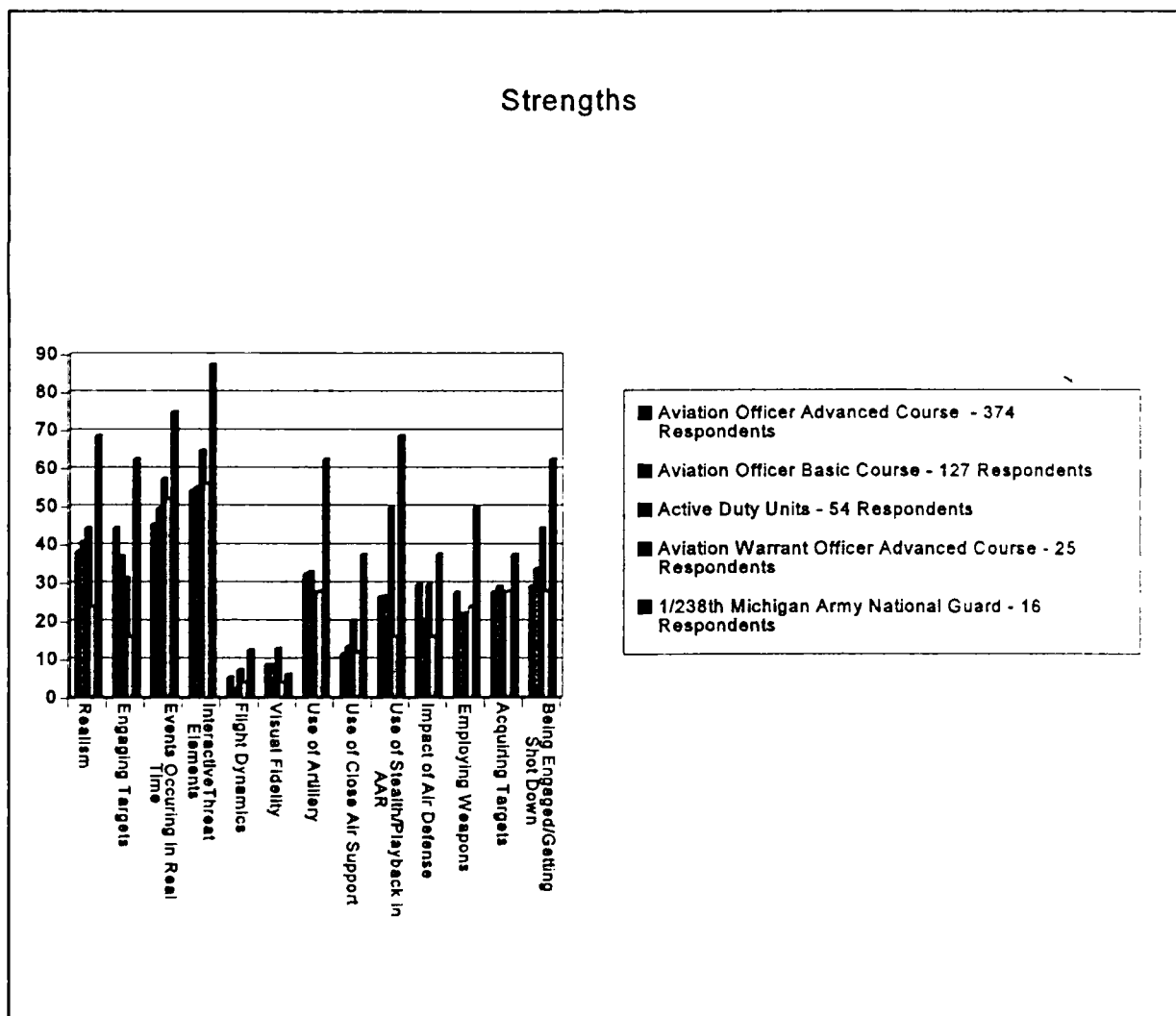 National Guard with a 100% favorable rating, believed BDS-D "Helped A Lot" or "Helped A Little". The negative responses were for the most part small, with 16% of the Aviation Warrant Officer Advanced Course and 2.6% of the Aviation Officer Advanced Course stating that the system "Did Not Help" or "Detracted From" the training. These were the only negative responses noted.

Overall Effectiveness

■ Aviation Officer Advanced Course - 374 Respondents

■ Aviation Officer Basic Course - 127 Respondents

■ Active Duty Units - 54 Respondents

■ Aviation Warrant Officer Advanced Course - 25 Respondents

■ 1/238th Michigan Army National Guard - 16 Respondents
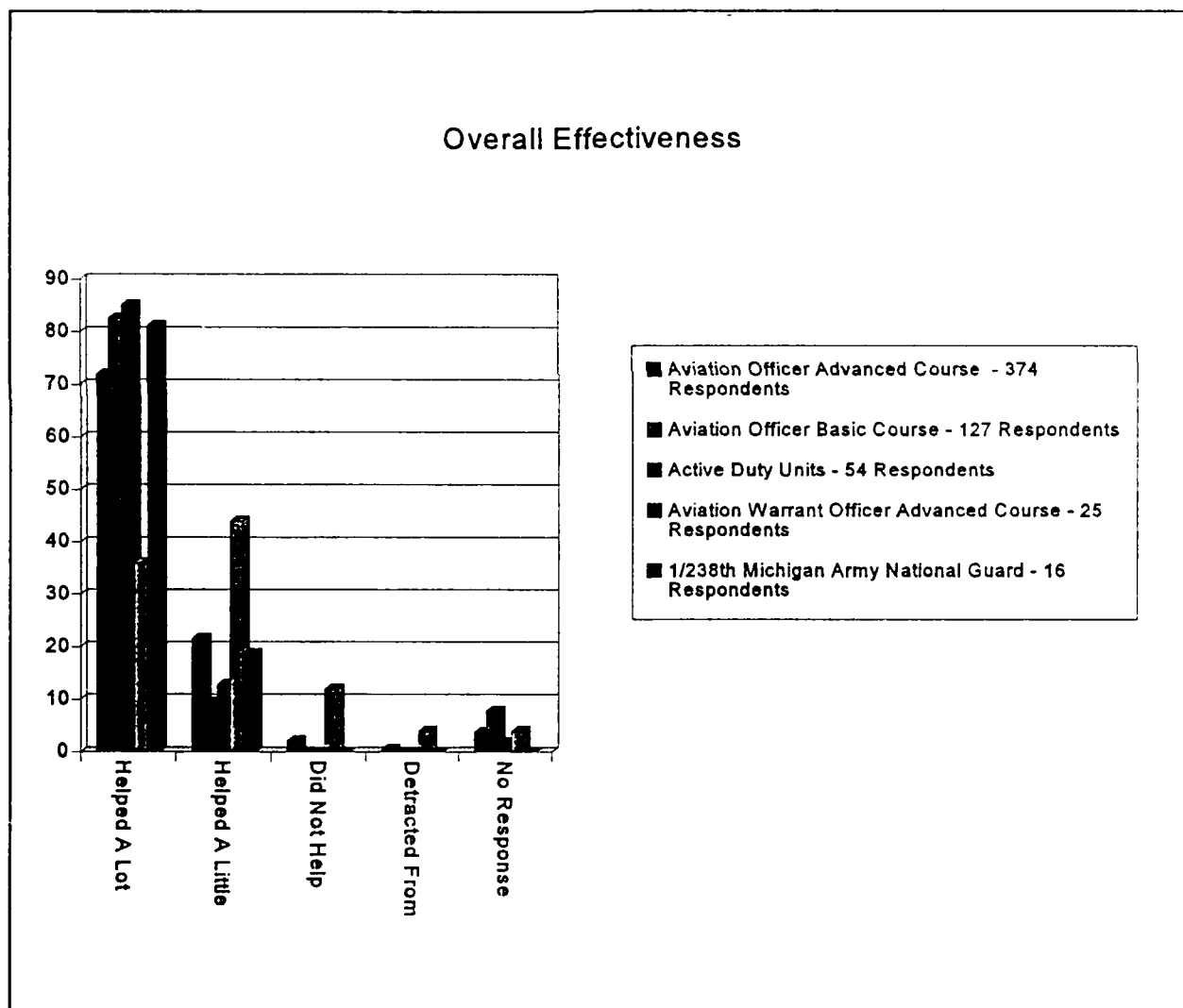
Strengths

Five of the thirteen attributes were viewed as strengths. The basis for this was a response of 50% or better. The 1/238 Michigan Army National Guard was the only group queried to choose Realism, Engaging Targets, Use of Artillery, Employing On-Board Weapons Systems, and Being Engaged as Strengths of the system. Three groups, the Active Duty Units, Warrant Officer Advanced Course and 1/238 Michigan Army National Guard were the only groups to identify Events Occurring in Real Time as a strength. The Active Duty Units and the 1/238 Michigan Army National Guard were the only groups to choose the Use of the Stealth and Interactive Playback for After Action Review as a Strength of the system. All groups were unanimous with respect to Interactive Threat playing a positive role in the training experience.

Strengths

Legend:
- Aviation Officer Advanced Course - 374 Respondents
- Aviation Officer Basic Course - 127 Respondents
- Active Duty Units - 54 Respondents
- Aviation Warrant Officer Advanced Course - 25 Respondents
- 1/238th Michigan Army National Guard - 16 Respondents

Categories (x-axis): Realism, Engaging Targets, Events Occuring in Real Time, Interactive Threat Elements, Flight Dynamics, Visual Fidelity, Use of Artillery, Use of Close Air Support, Use of Stealth/Playback in AAR, Impact of Air Defense, Employing Weapons, Acquiring Targets, Being Engaged/Getting Shot Down

Weaknesses

When asked about the weaknesses of the system, only two attributes out of the thirteen were referred to - Flight Dynamics and Visual Fidelity. These attributes were considered weaknesses if at least 50% of the groups queried chose those attributes. All groups queried felt that Flight Dynamics represented a weakness of the system. Only one group, the 1/238 Michigan Army National Guard, viewed Visual Fidelity as a weakness.

Weaknesses
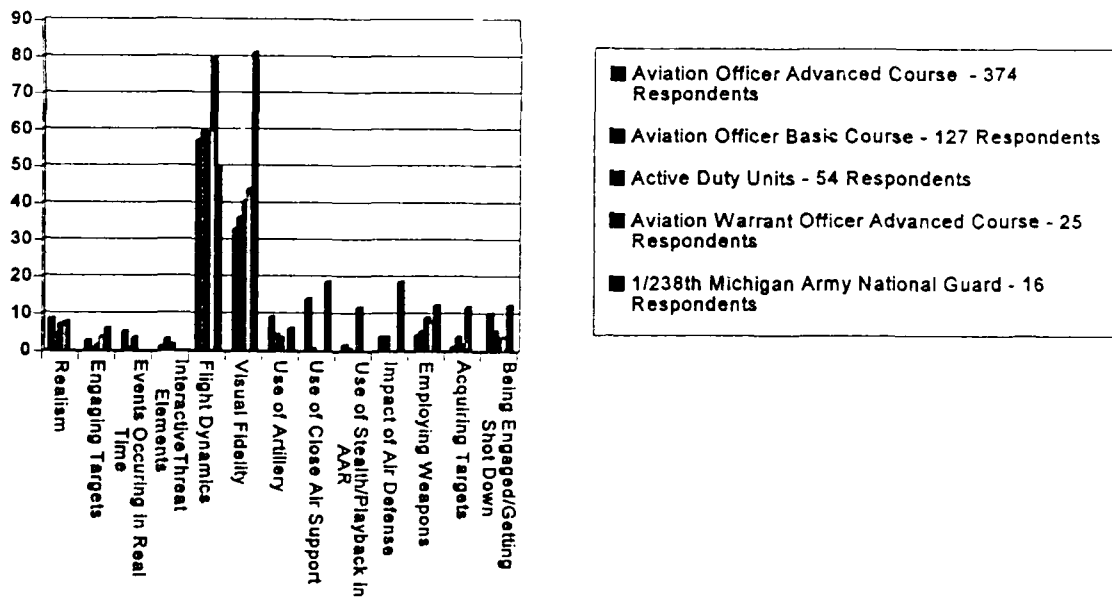
Cost Analysis

Flying hour costs are provided by Fort Rucker's Cost and Management Analysis Division located within the Directorate of Resource Management. Interestingly, the total costs by aircraft category (AH-64, OH-58D, and UH-60) have increased 7.7%, 19.6%, and 12.4% respectively over the last year. Site device flying hour costs have remained unchanged during the same period. The cost per flying hour for a site rotary wing device is $42.75.

Cost Per Flying Hour

	AH-64	OH-58D	UH-60
LABOR	$1,150.00	$595.00	$420.00
PARTS	$205.00	$267.00	$110.00
*DLRS	$1,621.00	$1,400.00	$618.00
POL	$90.00	$28.00	$72.00
REFUEL	$23.00	$8.00	$19.00
TOTAL	$3,098.00	$2,298.00	$1,239.00

* Asterick denotes Depot Level Repairables System

During the period covered by this report, a total 5,500 hours were flown in the AVTB rotary wing devices. Of that total 4,675 were flown in an AH-64 configuration, 550 were flown in an OH-58D configuration, and the remaining 275 were flown in a UH-60 configuration. Even with the 60% solution, differences are significant.

Utilization Flying Hour Costs